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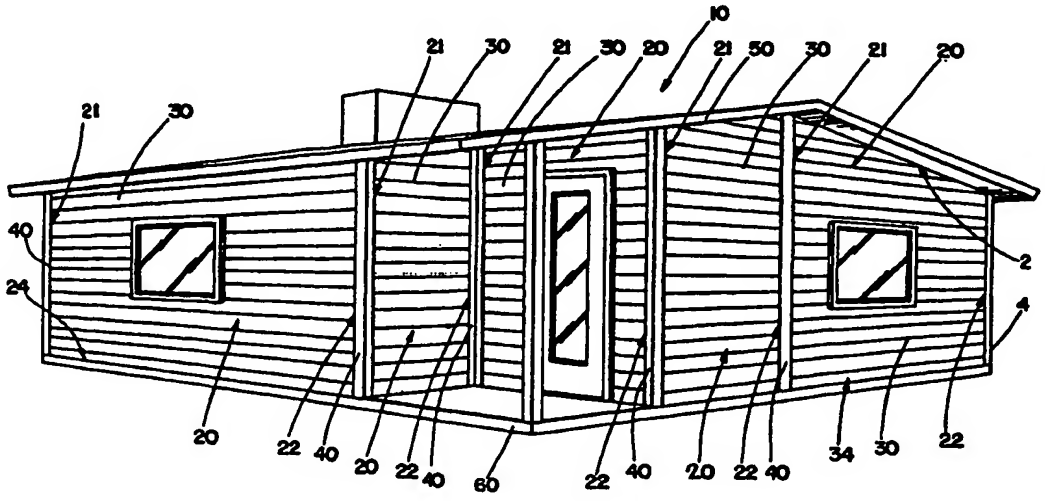

(57) Abstract

A modular wall structure comprised of a plurality of horizontally–oriented wall panels which are extruded components that are connected together in a stack. A plurality of modular wall structures of the present invention may be connected by fastening panels. The fastening panels may also be extruded components. In addition, preferred embodiments of the present invention may include a foundation, a roof, and an interior wall section. The roof may be comprised of a roofing panel which is an extruded component. Similary, the interior wall section may be comprised of a plurality of horizontally–oriented interior wall panels which are extruded components that are connected together in a stack.

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MODULAR BUILDING STRUCTURES COMPRISED OF EXTRUDED COMPONENTS

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates generally to modular building structures, and more particularly to, modular building structures comprised of extruded components. Modular building structures are typically fabricated in a factory and then assembled at the construction site. This offers the potential for high quality, precise building structures that require minimal on site construction. As a result, modular building techniques may be used to produce affordable building structures such as housing for new starts.

Solid wood has typically been employed for modular building structures. However, there is a scarcity of large logs that are appropriate for such modular building structures. Other disadvantages of traditional solid wood modular building structures include labor-intensive construction, cost, the inherent tendency of solid wood to warp, twist, splinter, rot, and become discolored, and the susceptibility of solid wood to air and bug infiltration.

In light of the deficiencies of traditional solid wood modular building structures, a need exists for modular building structures that do not use solid wood as a primary structural component. Another need exists for horizontally-oriented modular wall structures. A need also exists for a means to reinforce horizontally-oriented modular wall structures. Still yet another need exists for an improved means to secure modular wall structures to a concrete foundation. In addition, a need exists for an improved method of interconnecting modular wall structures.

The present invention satisfies some or all of these needs. In particular, the present invention provides modular building structures that are comprised of extruded components which are preferably durable and aesthetically-appealing. The extruded components of the present invention may be mass produced at relatively low cost. Moreover, the extruded components of the present invention may be precisely installed with great ease and speed.

A preferred embodiment of the present invention is a modular wall structure. The modular wall structure is comprised of a plurality of horizontally-oriented wall panels which are extruded components that are connected together in a stack. A plurality of modular wall structures may be connected by fastening panels. The fastening panels may also be extruded components. In addition, preferred embodiments of the present invention may include a foundation, a roof, and an interior wall section. The roof may be comprised of a roofing panel which is an extruded component. Similarly, the interior wall section may be comprised of a plurality of horizontally-oriented interior wall panels which are extruded components that are connected together in a stack.

The extruded components utilized in the present invention may be produced from any material that may be adapted to be formed into a predetermined extruded shape. Consequently, the extruded components may be comprised of thermoplastic material including, but not limited to, multi-layer films, polyethylene (HDPE), polypropylene, polyvinyl chloride (PVC), low density polyethylene (LDPE), CPVC ABS, ethyl-vinyl acetate, other similar polyethylene copolymers, other similar thermoplastic materials, other sufficiently rigid thermoplastic materials, or formulations that incorporate any of the aforementioned thermoplastic materials. Accordingly, the extruded components may also be produced from cellulosic/polymer composites.

In addition to the novel features and advantages mentioned above, other objects and advantages of the present invention will be readily apparent from the following descriptions of the drawings and preferred embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of the present invention embodied as a modular home;

Figure 2 is a front elevational view of the modular home shown in Figure 1;

Figure 3 is a right side elevational view of the modular home shown in Figure 1;

Figure 4 is a left side elevational view of the modular home shown in Figure 1;

Figure 5 is a rear elevational view of the modular home shown in Figure 1;

Figure 6 is a perspective view of a first embodiment of horizontally-oriented exterior wall panels of the present invention that are connected together in a stack;

Figure 7 is a perspective view of a second embodiment of horizontally-oriented exterior wall panels of the present invention that are connected together in a stack;

Figure 8 is a cross sectional view of a third embodiment of a horizontally-oriented exterior wall panel of the present invention;

Figure 9 is a cross sectional view of a fourth embodiment of a horizontally-oriented exterior wall panel of the present invention;

Figure 10 is a perspective view of a first embodiment of vertically-oriented exterior wall panels of the present invention that are connected together in a stack;

Figure 11 is a perspective view of a second embodiment of vertically-oriented exterior wall panels of the present invention that are connected together in a stack;

Figure 12 is a side elevational view of a preferred embodiment of a roofing panel of the present invention;

Figure 13 is a cross sectional view of a preferred embodiment of a roof connector of the present invention;

Figure 14 is a partial cross sectional view of a preferred embodiment of a roof assembly of the present invention;

Figure 15 is a cross sectional view of one embodiment of an exterior wall starter of the present invention which connects at least a portion of an exterior wall to a foundation;

Figure 16 is a cross sectional view of a second embodiment of an exterior wall starter of the present invention;

Figure 17 is a cross sectional view of the exterior wall starter shown in Figure 16 connecting at least a portion of an exterior wall to a foundation;

Figure 18 is a top plan view of a preferred embodiment of an interior wall connector of the present invention;

Figure 19 is a perspective view of a preferred embodiment of an interior wall section of the present invention connected to the inside of an exterior wall section;

Figure 20 is a cross sectional view of a preferred embodiment of an interior wall panel of the present invention;

Figure 21 is a cross sectional view of a preferred embodiment of an interior wall starter of the present invention which connects at least a portion of an interior wall to a foundation;

Figure 22 is a perspective view of one embodiment of a fastening panel of the present invention that may join two exterior wall sections at an angle;

Figure 23 is a perspective view of a second embodiment of a fastening panel of the present invention that may join two exterior wall sections together such that the two exterior

wall sections are substantially coplanar and that may join an exterior wall section to an interior wall section at an angle of approximately 90 degrees;

Figure 24 is a cross sectional view of a third embodiment of a fastening panel of the present invention that may be interlocked with an exterior wall section;

Figure 25 is a cross sectional view of a fourth embodiment of a fastening panel of the present invention;

Figure 26 is a cross sectional view of the fastening panel shown in Figure 25 connecting wall sections of the present invention together;

Figure 27 is a cross sectional view of a fifth embodiment of a fastening panel of the present invention;

Figure 28 is a cross sectional view of the fastening panel shown in Figure 27 connecting wall sections of the present invention together;

Figure 29 is a cross sectional view of a preferred embodiment of an exterior wall panel of the present invention which is adapted to be a sided exterior wall baseboard;

Figure 30 is a partial cross sectional view of a modular building structure of the present invention;

Figure 31 is a cross sectional view of a window frame of the present invention; and

Figure 32 is a cross sectional view of a jamb of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT(S)

The present invention is directed to modular building structures comprised of extruded components. By using extruded components, the present invention provides modular building structures which may be constructed with great ease and speed. Moreover,

the extruded components are preferably durable and aesthetically-appealing, and they may be mass produced at relatively low cost.

Figures 1 through 5 are perspective views of a preferred embodiment of a modular building structure 10 of the present invention. As shown in Figures 1 through 5, the modular building structure 10 comprises a plurality of exterior wall sections 20 and a plurality of fastening panels 40. At least one exterior wall section 20 is comprised of a plurality of exterior wall panels 30 which are extruded components that are connected together in a stack. In addition, each fastening panel 40 preferably connects one of the plurality of exterior wall sections 20 to another of the plurality of exterior wall sections 20.

Each exterior wall panel 30 may have at least one receptacle and/or at least one protrusion. In addition, at least one hollow preferably extends through each exterior wall panel 30. A protrusion of one exterior wall panel 30 is preferably adapted to fit into a receptacle of an adjacent exterior wall panel 30. Consequently, the exterior wall panels 30 may be connected together in a stack by inserting a protrusion of one exterior wall panel 30 into a receptacle of an adjacent exterior wall panel 30. In addition, it is preferred that an adhesive or other similar means is used to further secure exterior wall panels 30 together in a stack.

As indicated by Figures 1 through 5, the plurality of exterior wall panels 30 may be horizontally-oriented. Figures 6 through 9 illustrate various embodiments of horizontally-oriented exterior wall panels 30. In particular, Figure 6 illustrates a preferred embodiment of horizontally-oriented exterior wall panels 30A that may be stacked in the above-described manner. As shown in Figure 6, each exterior wall panel 30A may have a bottom side 33A and a top side 34A. Each bottom side 33A may have at least one receptacle 31A, and each

top side **34A** may have at least one protrusion **32A** which is adapted to mate with the at least one receptacle **31A** of an adjacent exterior wall panel **30A**. Consequently, the exterior wall panels **30A** may be connected together in a stack by inserting the at least one protrusion **32A** of one exterior wall panel **30A** into the at least one receptacle **31A** of an adjacent exterior wall panel **30A**. In this type of embodiment, the at least one receptacle **31A** may be a channel.

Figure **6** also shows a preferred method for reinforcing various embodiments of horizontally-oriented exterior wall panels **30**. As shown in the example of Figure **6**, reinforcement material **132A** may be inserted in a hollow **130A** of an exterior wall panel **30A**. It is preferred that reinforcement material extends throughout the length of a hollow for maximum reinforcement. It is also preferred that the reinforcement material connects the horizontally-oriented exterior wall panel **30** to at least one fastening panel **40** for additional support. The reinforcement material may be any material that further supports, reinforces, strengthens, and/or stabilizes an exterior wall section **20** and/or an exterior wall panel **30**. For example, the reinforcement material may be a tube, pipe, rod, cylinder, sand, cement, or any other similar material or device.

Figure **7** illustrates another preferred embodiment of horizontally-oriented exterior wall panels **30B** that may be stacked one on top of the other. As shown in Figure **7**, each exterior wall panel **30B** may have a bottom side **33B**, a top side **34B**, and at least one hollow **130B**. Each top side **34B** may have at least one receptacle **31B**, and each bottom side **33B** may have at least one protrusion **32B** which is adapted to mate with the at least one receptacle **31B** of an adjacent exterior wall panel **30B**. As a result, the exterior wall panels **30B** may be connected together in a stack by inserting the at least one protrusion **32B** of one exterior wall

panel **30B** into the at least one receptacle **31B** of an adjacent exterior wall panel **30B**. As Figure 7 illustrates, the at least one receptacle **31B** may be a channel.

Figure **8** illustrates yet another preferred embodiment of a horizontally-oriented exterior wall panel **30C** that may be stacked. As shown in Figure **8**, each exterior wall panel **30C** may have a bottom side **33C**, a top side **34C**, and at least one hollow **130C**. Each bottom side **33C** may have at least one receptacle **31C**, and each top side **34C** may have at least one protrusion **32C** which is adapted to mate with the at least one receptacle **31C** of an adjacent exterior wall panel **30C**. Consequently, the exterior wall panels **30C** may be connected together in a stack by inserting the at least one protrusion **32C** of one exterior wall panel **30C** into the at least one receptacle **31C** of an adjacent exterior wall panel **30C**. In this type of embodiment, the at least one receptacle **31C** may be a channel.

Still another embodiment of a horizontally-oriented exterior wall panel **30D** is illustrated in Figure **9**. As shown in Figure **9**, each exterior wall panel **30D** may have a bottom side **33D**, a top side **34D**, and at least one hollow **130D**. Each bottom side **33D** may have at least one receptacle **31D**, and each top side **34D** may have at least one protrusion **32D** which is adapted to mate with the at least one receptacle **31D** of an adjacent exterior wall panel **30D**. Consequently, the exterior wall panels **30D** may be connected together in a stack by inserting the at least one protrusion **32D** of one exterior wall panel **30D** into the at least one receptacle **31D** of an adjacent exterior wall panel **30D**. In this type of embodiment, the at least one receptacle **31D** may be a channel.

In another preferred embodiment, the plurality of exterior wall panels **30** may be vertically-oriented. Figures **10** and **11** show various embodiments of vertically-oriented exterior wall panels **30**. Figure **10** illustrates a preferred embodiment of vertically-oriented

exterior wall panels **30E** that may be stacked alongside each other. Figure **10** shows that each exterior wall panel **30E** may have a left side **37E** and a right side **38E**. Each left side **37E** may have at least one receptacle **35E**, and each right side **38E** may have at least one protrusion **36E** which is adapted to mate with the at least one receptacle **35E** of an adjacent exterior wall panel **30E**. Consequently, the exterior wall panels **30E** may be connected together in a stack by inserting the at least one protrusion **36E** of one exterior wall panel **30E** into the at least one receptacle **35E** of an adjacent exterior wall panel **30E**. In this type of embodiment, the at least one receptacle **35E** may be a channel.

Figure **11** illustrates another preferred embodiment of vertically-oriented exterior wall panels **30F** that may be stacked alongside each other. As shown in Figure **11**, each exterior wall panel **30F** may have a left side **37F** and a right side **38F**. Each right side **38F** may have at least one receptacle **35F**, and each left side **37F** may have at least one protrusion **36F** which is adapted to mate with the at least one receptacle **35F** of an adjacent exterior wall panel **30F**. The exterior wall panels **30F** may then be connected together in a stack by inserting the at least one protrusion **36F** of one exterior wall panel **30F** into the at least one receptacle **35F** of an adjacent exterior wall panel **30F**. The at least one receptacle **35F** may be a channel in this type of embodiment.

A preferred embodiment of the present invention interlocks adjacent exterior wall panels **30** in an exterior wall section **20**. Preferred embodiments of this feature are shown in Figure **10** and **11** with vertically-oriented exterior wall panels **30**. However, this feature is not limited to vertically-oriented exterior wall panels **30**. Horizontally-oriented exterior wall panels **30** may also be interlocked in the same or similar manner.

Figure 29 illustrates a preferred embodiment of an exterior wall panel 30G which is adapted to be a sided exterior wall baseboard. Accordingly, this embodiment is preferably adapted to be on the bottom of the stack of exterior wall panels 30. This embodiment is also preferably adapted to engage a piece of siding 120. In addition, the siding 120 is preferably adapted to be engaged by this embodiment of the exterior wall panel 30G.

A fastening panel 40 may be adapted to connect an exterior wall section 20 to another exterior wall section 20 or to an interior wall section at practically any desired angle. Referring back to Figures 1 through 5, an exterior wall section 20 may have a left edge 21 and a right edge 22. A fastening panel 40 may join the left edge 21 of one exterior wall section 20 to the right edge 22 of another exterior wall section 20. As a result, the left edge 21 of each exterior wall section 20 may be joined to the right edge 22 of an adjacent exterior wall section 20 by one of the plurality of fastening panels 40.

A fastening panel 40 may be an extruded component. As illustrated in Figures 1 through 5, a fastening panel 40 may join two of the exterior wall sections 20 together at an angle. The angle may be about 90 degrees, about 180 degrees, or practically any other desired angle.

Figures 22 through 28 illustrate various embodiments of fastening panels 40. In particular, Figure 22 shows a preferred embodiment of a fastening panel 40A which is adapted to join two exterior wall sections 20 together at an angle which is about 90 degrees. In this embodiment, the fastening panel 40A may have a plurality of grooves 42A and an opening 44A. A groove 42A is preferably adapted to receive an edge of an exterior wall section 20. A preferred method for inserting an edge of an exterior wall section 20 into a

groove 42A is moving the exterior wall section 20 in the direction indicated by arrow 48A such that the edge slides into the groove 42A.

Figure 22 also shows a preferred method for reinforcing various embodiments of fastening panels 40. As shown in the example of Figure 22, reinforcement material 46A may be placed in the opening 44A. The reinforcement material may be any material that further supports, strengthens, reinforces, and/or stabilizes the modular building structure 10. Accordingly, the reinforcement material may include, but is not limited to, sand, cement, a tube, a rod, a cylinder, a pipe, and/or any other similar device or material. In addition, the reinforcement material may be set in the foundation.

On the other hand, Figures 1 through 5 also show that a fastening panel 40 may join two of the exterior wall sections 20 together such that the two exterior wall sections 20 are substantially coplanar. Figure 23 illustrates a preferred embodiment of a fastening panel 40B which is adapted to join two exterior wall sections 20 together such that the two exterior wall sections 20 are substantially coplanar. The fastening panel 40B may also be adapted to join an exterior wall section 20 and an interior wall section 80 together at an angle which is about 90 degrees. Similar to the embodiment shown in Figure 22, this embodiment may have a plurality of grooves 42B and an opening 44B. Reinforcement material may be placed in the opening 44B in order to further support and/or stabilize a modular building structure 10.

In addition, a fastening panel 40 may be interlocked with one of the plurality of exterior wall sections 20. Figure 24 shows a preferred embodiment of a fastening panel 40C which is adapted to be interlocked with an exterior wall section 20. This embodiment may include a receptacle 41C, a protrusion 43C, an opening 44C, and reinforcement material 46C such as a steel pipe. In this embodiment, the receptacle 41C is preferably adapted to interlock

with an edge of an exterior wall section **20**. The protrusion **43C** is also preferably adapted to interlock with an edge of an exterior wall section **20**.

Figures **25** and **26** illustrate an example of a fastening panel **40D**. As shown in Figure **26**, the fastening panel **40D** is adapted to join two exterior wall sections **20** together such that the two exterior wall sections **20** are substantially coplanar. The fastening panel **40D** may also be adapted to join an exterior wall section **20** and an interior wall section **80** together at an angle which is about 90 degrees.

The fastening panel **40D** is comprised of at least one penetrating member **49D**. A penetrating member **49D** preferably limits lateral movement of a wall section in relation to the fastening panel. As shown in Figure **26**, a fastening panel **40D** preferably has at least one penetrating member **49D** connected to each surface that abuts, connects, and/or is adjacent to a wall section. A penetrating member **49D** may extend into a notch **150** in an edge of a horizontally-oriented or a vertically-oriented exterior or interior wall panel. In particular, it is preferred that a penetrating member **49D** extends along the length of a fastening panel **40D** such that the penetrating member **49D** is received by notches **150** in edges of horizontally-oriented wall panels that are connected together in a stack.

Figure **26** shows a preferred method for interconnecting and reinforcing wall sections using a fastening panel **40D**. A fastening panel **40D** may include at least one aperture **47D**. A fastening panel **40D** preferably has at least one aperture **47D** in each surface that abuts, connects, and/or is adjacent to a wall section such that a reinforcing member **46D** may extend through a hollow in a horizontally-oriented wall panel and connect to another fastening panel **40**. For maximum reinforcement, it is preferred that the fastening panel **40D** has at least one aperture **47D** which corresponds to each wall panel in order to allow for reinforcement of

each wall panel. In addition, it is preferred that the reinforcing member **46D** has at least one threaded end in order to receive a nut or any other similar device. Accordingly, it is preferred that a reinforcing member **46D** is a bolt. However, it should be recognized that a reinforcing member **46D** may be any device that is adapted to extend through an aperture **47D** and at least a portion of the way through a wall panel including, but not limited to, a pin, bolt, tube, rod, pipe, cylinder, or any other similar device. If necessary, access holes or openings may be provided in a surface of a fastening panel **40D** in order to allow for insertion of a reinforcing member **46D** or to allow access to a nut or any type of fastening device. If desired, a trim profile or any other adequate covering device may be connected to the fastening panel **40D** to cover the access holes or openings when access is not needed.

Figure **26** also shows that the respective edges of exterior wall panels **30** and interior wall panels **110** may include expansion blocks **140**. An expansion block **140** is preferably adapted to expand and contract to provide a 'tight' connection between a fastening panel **40** and a wall panel. For example, an expansion block **140** may expand and contract to compensate for expansion and contraction of a wall panel and/or a fastening panel. In addition, an expansion block **140** is preferably adapted to provide insulating value and to limit air flow through the joint between a fastening panel and a wall panel. It should be recognized that an expansion block **140** may block some, all, or none of an entry to a hollow of a wall panel. If desired, access openings or breaks may be provided in an expansion block **140** to allow for insertion of a penetrating member, a reinforcing member, or practically any other device.

An expansion block **140** may be comprised of practically any material that is adapted to expand and contract. For example, it is preferred that an expansion block **140** is comprised

of elastic material including, but not limited to, foamed rubber, any other similar material, or any other foamed plastic, polymer, or thermoplastic material. An expansion block **140** may be connected to an edge of the extruded portion of a wall panel by conventional means. In a preferred embodiment of the invention, an expansion block **140** is connected to an edge of the extruded portion of a wall panel by an adhesive, an epoxy, or practically any other similar material.

Figures **27** and **28** show yet another embodiment of a fastening panel **40E**. A fastening panel **40E** may be adapted to connect two exterior wall sections **20** together at an angle of approximately 90 degrees. A fastening panel **40E** is comprised of a penetrating member **49E**. As shown in Figure **28**, a fastening panel **40E** preferably has at least one penetrating member **49E** on each surface that abuts, connects, and/or is adjacent to a wall section. A penetrating member **49E** may extend into a notch **150** in an edge of a horizontally-oriented or a vertically-oriented wall panel. In particular, it is preferred that a penetrating member **49E** extends along the length of a fastening panel **40E** such that the penetrating member **49E** is received by notches **150** in edges of horizontally-oriented wall panels that are connected together in a stack.

Figure **28** also shows a preferred method for interconnecting and reinforcing wall sections using a fastening panel **40E**. A fastening panel **40E** may include at least one aperture **47E**. A fastening panel **40E** preferably has at least one aperture **47E** in each surface that abuts, connects, and/or is adjacent to a wall section such that a reinforcing member **46E** may extend through a hollow in a horizontally-oriented wall panel and connect to another fastening panel **40**. For maximum reinforcement, it is preferred that the fastening panel **40E** has at least one aperture **47E** which corresponds to each wall panel in order to allow for

reinforcement of each wall panel. In addition, it is preferred that the reinforcing member **46E** has at least one threaded end in order to receive a nut or any other similar device. Accordingly, it is preferred that a reinforcing member **46E** is a bolt. However, it should be recognized that a reinforcing member **46E** may be any device that is adapted to extend through an aperture **47E** and at least a portion of the way through a wall panel including, but not limited to, a pin, bolt, tube, rod, pipe, cylinder, or any other similar device. If necessary, access holes or openings may be provided in a surface of a fastening panel **40E** in order to allow for insertion of a reinforcing member **46E** or to allow access to a nut or any type of fastening device. If desired, a trim profile or any other adequate covering device may be connected to the fastening panel **40E** to cover the access holes or openings when access is not needed.

Although not shown in the drawings, it should be recognized that fastening panels **40A, 40B** may both have at least one aperture and/or at least one penetrating member substantially as described above with regard to fastening panels **40D, 40E**. Those skilled in the art should also recognize that a reinforcing member may be used in conjunction with fastening panels **40A, 40B** substantially as described above with regard to fastening panels **40D, 40E**. Finally, those skilled in the art should recognize that fastening panels **40A, 40B** may both be provided with access holes or openings substantially as described above with regard to fastening panels **40D, 40E**.

Another preferred embodiment of a modular building structure **10** includes a roof **50** which is preferably adapted to cover the interior of a modular building structure **10**. In one embodiment, the top edges of the exterior wall sections **20** may define at least a portion of a roof support **23**. The roof support **23** may also be comprised of additional support and/or

connecting members. As indicated by Figures 1, 3, and 4, the roof support 23 and the roof 50 are preferably adapted such that the roof 50 may be connected to the roof support 23. The roof 50 may be comprised of a roofing panel 52 which is a thermoplastic extruded component. Figure 12 illustrates a preferred embodiment of a roofing panel 52. Alternatively, metal studs may comprise the roof 50.

The roof support 23 preferably includes a roof connector 54 which is adapted to rest on or be engaged by the top edge of an exterior wall section 20. Figure 13 illustrates a preferred embodiment of a roof connector 54. The roof connector 54 may be an extruded component. However, it is preferred that the roof connector 54 is comprised of roll formed sheet metal or other similar material.

Figure 14 is a partial cross sectional view of a preferred embodiment of a roof assembly 51 of the present invention. In this embodiment of the roof assembly 51, the roof 50 is secured to the roof connector 54 by screws 53. As shown in this example, the roof connector 54 preferably has receptacles through which the screws 53 may extend in order to secure the roof 50. Alternatively, bolts, nails, rods, adhesives, or other conventional materials or devices may be used to secure the roof 50 to the roof connector 54. The roof connector 54 may be similarly connected to the exterior wall panel 30. In this example, the roof connector 54 is secured to the exterior wall panel 30 by screws 55 which extend into and engage the exterior wall panel 30. However, it should be recognized that bolts, nails, rods, adhesives, or other conventional materials or devices may be used to secure the roof connector 54 to the exterior wall panel 30.

As shown in Figure 14, the roof assembly 51 may be comprised of additional support mechanisms. In this example, the roof connector 54 includes a ledge 57. A support bar 58

may be adapted to rest on the ledge **57** and extend to another ledge, wall structure, or support mechanism. The support bar **58** may be secured to the ledge **57** by adhesives or other conventional means. The support bar **58** may be adapted to brace opposing wall structures. In addition, a reinforcing plate **56** may be connected by conventional means such as nails, screws, or adhesives between the roof **50** and a support bar **58** in order to reinforce the roof **50**. The reinforcing plate **56** is preferably comprised of sheet metal or other similar material.

A preferred embodiment of a modular building structure **10** may include a foundation **60**. As shown in Figures **1** through **5**, the bottom edges of the exterior wall sections **20** may define an exterior base **24**. The foundation **60** may be connected to at least a portion of the exterior base **24**.

A preferred embodiment of the modular building structure **10** may include at least one exterior wall starter which is adapted to connect at least a portion of a bottom edge of an exterior wall section **20** to a foundation **60**. A preferred embodiment of an exterior wall starter **70A** is shown in Figure **15**. Figure **15** also shows a preferred method for securing an exterior wall starter **70A** to a foundation **60**. In this example, the exterior wall starter **70A** is set in a concrete foundation **60**. It should be recognized, however, that an exterior wall starter may be secured to a foundation **60** by any conventional means such as, but not limited to, adhesives, nails, bolts, screws, or other similar means.

Figures **16** and **17** show another embodiment of an exterior wall starter **70B**. An exterior wall starter **70B** is comprised of a top side **72B** and at least one extension **74B**. An exterior wall starter **70B** may also include a rim **76B**. As shown in the example of Figure **17**, at least one extension **74B** is connected to the top side **72B** and extends into a foundation **60** which is preferably comprised of concrete. In this manner, the exterior wall starter **70B** may

be set in a concrete foundation **60**. The rim **76B**, on the other hand, is connected to the top side **72B** and preferably extends up along an inner surface of an exterior wall panel **30**. However, it should also be recognized that a rim may also extend up an outer surface of an exterior wall panel **30**. In the example of Figure **17**, the rim **76B** is preferably adapted to prevent water, dirt, and other similar moisture and debris from entering the interior of a building structure through the joint between an exterior wall starter and an exterior wall panel **30**.

An exterior wall starter may be an extruded component. As shown in the examples of Figures **15** and **17**, an exterior wall starter **70A**, **70B** preferably has a top side **72A**, **72B** which is adapted to engage and/or mate with at least a portion of the bottom edge of an exterior wall section **20**. In addition, it is preferred that an adhesive or other similar means is used to further secure at least a portion of the bottom edge of an exterior wall section **20** to an exterior wall starter. In these or other conventional manners, an exterior wall starter may connect at least a portion of the exterior base **24** to a foundation **60**.

In a preferred embodiment of the present invention, an exterior wall section **20** may have an inside **25**. In addition, a preferred embodiment of a modular building structure **10** may have at least one interior wall section **80**. An interior wall section **80** may be connected to the inside **25** of an exterior wall section **20**. An interior wall section **80** may be an extruded component.

A preferred embodiment of a modular building structure **10** may further comprise at least one interior wall connector **90** which is adapted to connect an interior wall section **80** to the inside **25** of an exterior wall section **20**. An interior wall connector **90** may be an extruded component. A preferred embodiment of an interior wall connector **90** is shown in

Figure 18. An interior wall connector 90 preferably includes a channel 92 which is adapted to receive an edge of an interior wall section 80. An interior wall connector 90 may be secured to the inside 25 by conventional means such as adhesives, screws, nails, bolts, or other similar materials or devices. Figure 19 illustrates how a preferred embodiment of an interior wall connector 90 may connect an interior wall section 80 to the inside 25 of an exterior wall section 20.

Similar to the exterior base 24 defined by the bottom edges of the exterior wall sections 20, the bottom edge of the at least one interior wall section 80 may define an interior base 82. If there is more than one interior wall section 80, the bottom edges of the interior wall sections 80 may define an interior base 82. The interior base 82 may be connected to a foundation 60.

A preferred embodiment of the modular building structure 10 may include at least one interior wall starter 100 which is adapted to be connected to a foundation 60. An interior wall starter 100 may be an extruded component. A preferred embodiment of an interior wall starter 100 is shown in Figure 21. The interior wall starter 100 preferably has a top side 102 which is adapted to engage and/or mate with at least a portion of the bottom edge of an interior wall section 80. In addition, it is preferred that an adhesive or other similar means is used to further secure at least a portion of the bottom edge of an interior wall section 80 to an interior wall starter 100. In this or a similar manner, an interior wall starter 100 may connect at least a portion of the interior base 82 to a foundation 60.

An interior wall section 80 may comprise a plurality of interior wall panels 110 which are extruded components that are connected together in a stack. Figures 19 and 20 illustrate

various embodiments of interior wall panels **110**. Figure **19** shows an embodiment of an interior wall panel **110A**, and Figure **20** shows an embodiment of an interior wall panel **110B**.

As shown in Figure **19**, a plurality of interior wall panels **110** may be horizontally-oriented. However, like the exterior wall panels **30**, the interior wall panels **110** may also be vertically oriented. Regardless of the orientation, each interior wall panel **110** may have at least one receptacle and/or at least one protrusion. A protrusion of one interior wall panel **110** is preferably adapted to fit into a receptacle of an adjacent interior wall panel **110**. As a result, the interior wall panels **110** may be connected together in a stack by inserting a protrusion of one interior wall panel **110** into a receptacle of an adjacent interior wall panel **110**. In addition, it is preferred that an adhesive or other similar means is used to further secure interior wall panels **110** together in a stack.

The interior wall panels **110** may be stacked in the same manner as the exterior wall panels **30**. Thus, in a preferred embodiment which includes a plurality of horizontally-oriented interior wall panels **110**, each interior wall panel **110** may have a bottom side and a top side. Each bottom side may have at least one receptacle, and each top side may have at least one protrusion which is adapted to fit into the at least one receptacle of an adjacent interior wall panel **110**. Consequently, the interior wall panels **110** may be connected together in a stack by inserting the at least one protrusion of one interior wall panel **110** into the at least one receptacle of an adjacent interior wall panel **110**. In this type of embodiment, the at least one receptacle may be a channel.

In another preferred embodiment that employs horizontally-oriented interior wall panels **110**, each interior wall panel **110** may have a bottom side and a top side. Each top side may have at least one receptacle, and each bottom side may have at least one protrusion

which is adapted to fit into the at least one receptacle of an adjacent interior wall panel **110**. As a result, the interior wall panels **110** may be connected together in a stack by inserting the at least one protrusion of one interior wall panel **110** into the at least one receptacle of an adjacent interior wall panel **110**. The at least one receptacle may be a channel in this type of embodiment.

In a preferred embodiment where the plurality of interior wall panels **110** are vertically-oriented, each interior wall panel **110** may have a left side and a right side. Each left side may have at least one receptacle, and each right side may have at least one protrusion which is adapted to fit into the at least one receptacle of an adjacent interior wall panel **110**. Consequently, the interior wall panels **110** may be connected together in a stack by inserting the at least one protrusion of one interior wall panel **110** into the at least one receptacle of an adjacent interior wall panel **110**. In this type of embodiment, the at least one receptacle may be a channel.

In another preferred embodiment that includes vertically-oriented interior wall panels **110**, each interior wall panel **110** may have a left side and a right side. Each right side may have at least one receptacle, and each left side may have at least one protrusion which is adapted to fit into the at least one receptacle of an adjacent interior wall panel **110**. The interior wall panels **110** may then be connected together in a stack by inserting the at least one protrusion of one interior wall panel **110** into the at least one receptacle of an adjacent interior wall panel **110**. The at least one receptacle may be a channel in this type of embodiment.

A preferred embodiment of the present invention may interlock adjacent interior wall panels **110** in an interior wall section **80**. Adjacent interior wall panels **110** may be

interlocked in the same manner that adjacent exterior wall panels **30** may be interlocked. Consequently, adjacent interior wall panels **110** may be interlocked regardless of their orientation.

One interior wall section **80** may be connected to another interior wall section **80**. Similar to a fastening panel **40**, an interior fastening panel may be adapted to connect an edge of one interior wall section **80** to an edge of another interior wall section **80**. For instance, an interior fastening panel may join two interior wall sections **80** together at an angle. The angle may be about 90 degrees. On the other hand, an interior fastening panel may join two of the interior wall sections **80** together such that the two interior wall sections are substantially coplanar. In addition, an interior fastening panel may be interlocked with an interior wall section **80**.

An interior fastening panel may be an extruded component. Although not shown, an interior fastening panel may be substantially similar to a fastening panel **40**, and it may interconnect wall sections in substantially the same way as a fastening panel **40**. In addition, it should be recognized that an interior fastening panel and an interior wall section **80** may be reinforced in substantially the same way as fastening panels **40** and exterior wall sections **20**.

In addition, an edge of one interior wall section **80** may be connected to a side of another interior wall section **80**. An embodiment of an interior wall connector **90** may be adapted to connect an edge of one interior wall section **80** to a side of another interior wall section **80**. Accordingly, this embodiment of an interior wall connector **90** preferably includes a channel which is adapted to receive an edge of an interior wall section **80**.

Figure **30** is a partial cross sectional view of a preferred embodiment of a building structure of the present invention. Figure **31** is a cross sectional view of a preferred

embodiment of a window frame of the present invention. Finally, Figure 32 is a cross sectional view of a preferred embodiment of a jamb of the present invention.

The preferred embodiments herein disclosed are not intended to be exhaustive or to unnecessarily limit the scope of the invention. The preferred embodiments were chosen and described in order to explain the principles of the present invention so that others skilled in the art may practice the invention. Having shown and described preferred embodiments of the present invention, those skilled in the art will realize that many variations and modifications may be made to affect the described invention. Many of those variations and modifications will provide the same result and fall within the spirit of the claimed invention. It is the intention, therefore, to limit the invention only as indicated by the scope of the claims.

WHAT IS CLAIMED IS:

1. A modular wall structure comprising:

a plurality of horizontally-oriented wall panels connected together in a substantially vertical stack, each of said wall panels being an extruded component having at least one receptacle and at least one protrusion;

wherein adjacent wall panels are connected together by inserting said at least one protrusion of a first adjacent wall panel into said at least one receptacle of a second adjacent wall panel.

2. The modular wall structure of claim 1 wherein each of said wall panels comprises:

a top side having said at least one protrusion; and

a bottom side connected to said top side, said bottom side having said at least one receptacle.

3. The modular wall structure of claim 1 wherein each of said wall panels comprises:

a top side having said at least one receptacle; and

a bottom side connected to said top side, said bottom side having said at least one protrusion.

4. The modular wall structure of claim 1 wherein said at least one receptacle is a channel.

5. The modular wall structure of claim 1 wherein said at least one protrusion of said first adjacent wall panel is adapted to mate with said at least one receptacle of said second adjacent wall panel.

6. The modular wall structure of claim 1 wherein said adjacent wall panels are interlocked.

7. The modular wall structure of claim 1 wherein each of said wall panels is comprised of thermoplastic material.

8. The modular wall structure of claim 1 further comprising:

a first fastening panel connected to a left edge of said modular wall structure;

a second fastening panel connected to a right edge of said modular wall structure; and

a reinforcing member extending through a hollow in one of said wall panels, said reinforcing member connected between said first fastening panel and said second fastening panel.

9. The modular wall structure of claim 8 wherein said reinforcing member is comprised of means for reinforcing said modular wall structure.

10. The modular wall structure of claim 8 wherein said first and second fastening panels are extruded components.

11. The modular wall structure of claim 1 further comprising:

a fastening panel connected to an edge of said modular wall structure, said fastening panel adapted to connect said modular wall structure to another wall structure.

12. The modular wall structure of claim 11 wherein:

one of said wall panels has an edge which defines a notch; and

said fastening panel has a penetrating member connected to a surface that is substantially adjacent to said edge of said modular wall structure, said penetrating member extending into said notch such that lateral movement of said modular wall structure in relation to said fastening panel is limited.

13. The modular wall structure of claim 11 wherein:

a plurality of said wall panels have edges that define notches; and

said fastening panel has a penetrating member connected to a surface that is substantially adjacent to said edge of said modular wall structure, said penetrating member extending into said notches such that lateral movement of said modular wall structure in relation to said fastening panel is limited.

14. The modular wall structure of claim 11 wherein said fastening panel is an extruded component.

15. A building component comprising:

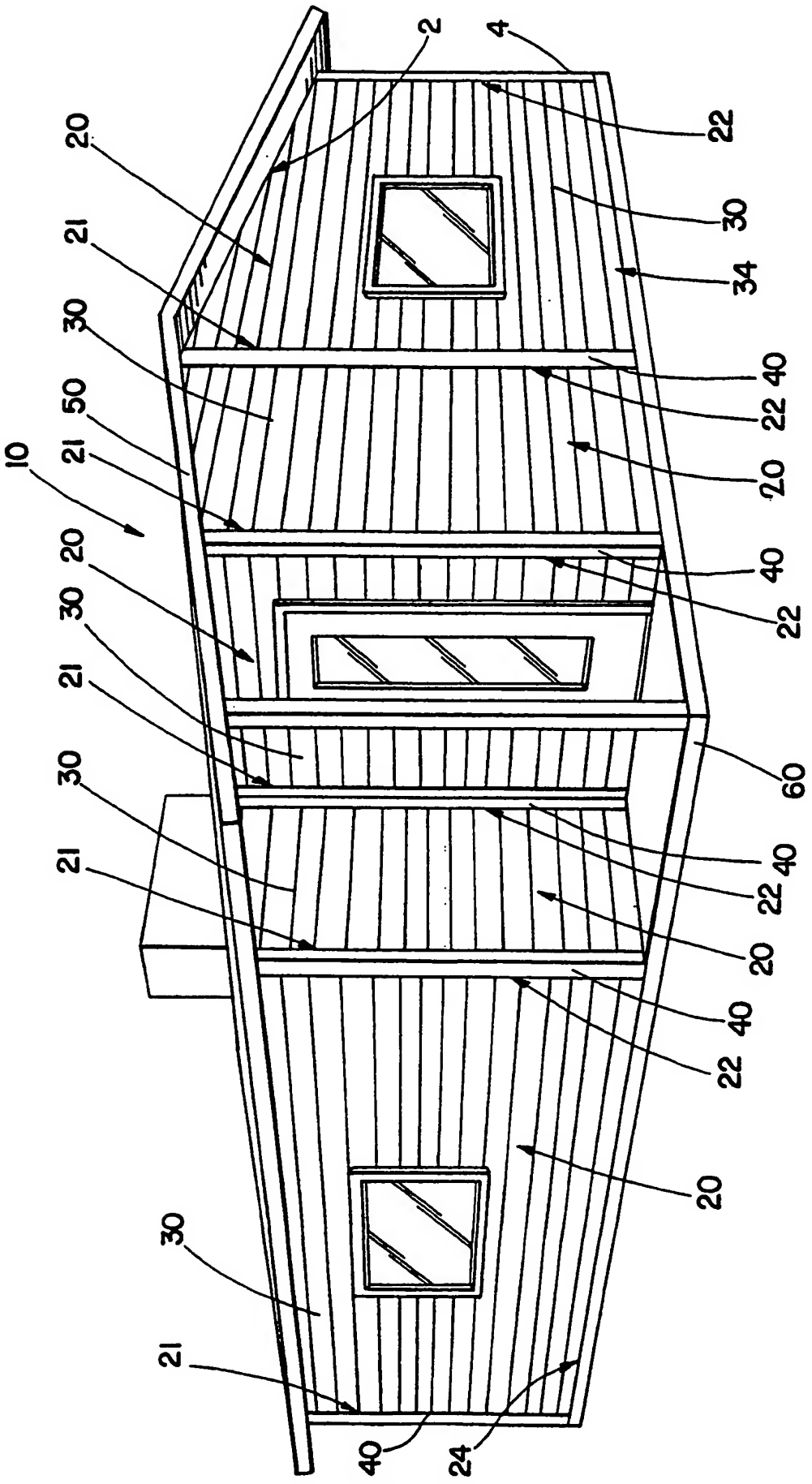
an extruded portion having an edge which defines at least one hollow; and

an expansion block connected to said edge;

wherein said expansion block is adapted to expand and contract.

16. The building component of claim 15 wherein said expansion block is comprised of elastic material.

17. The building component of claim 16 wherein said expansion block is comprised of a foamed polymer.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40
24

Fig. 1

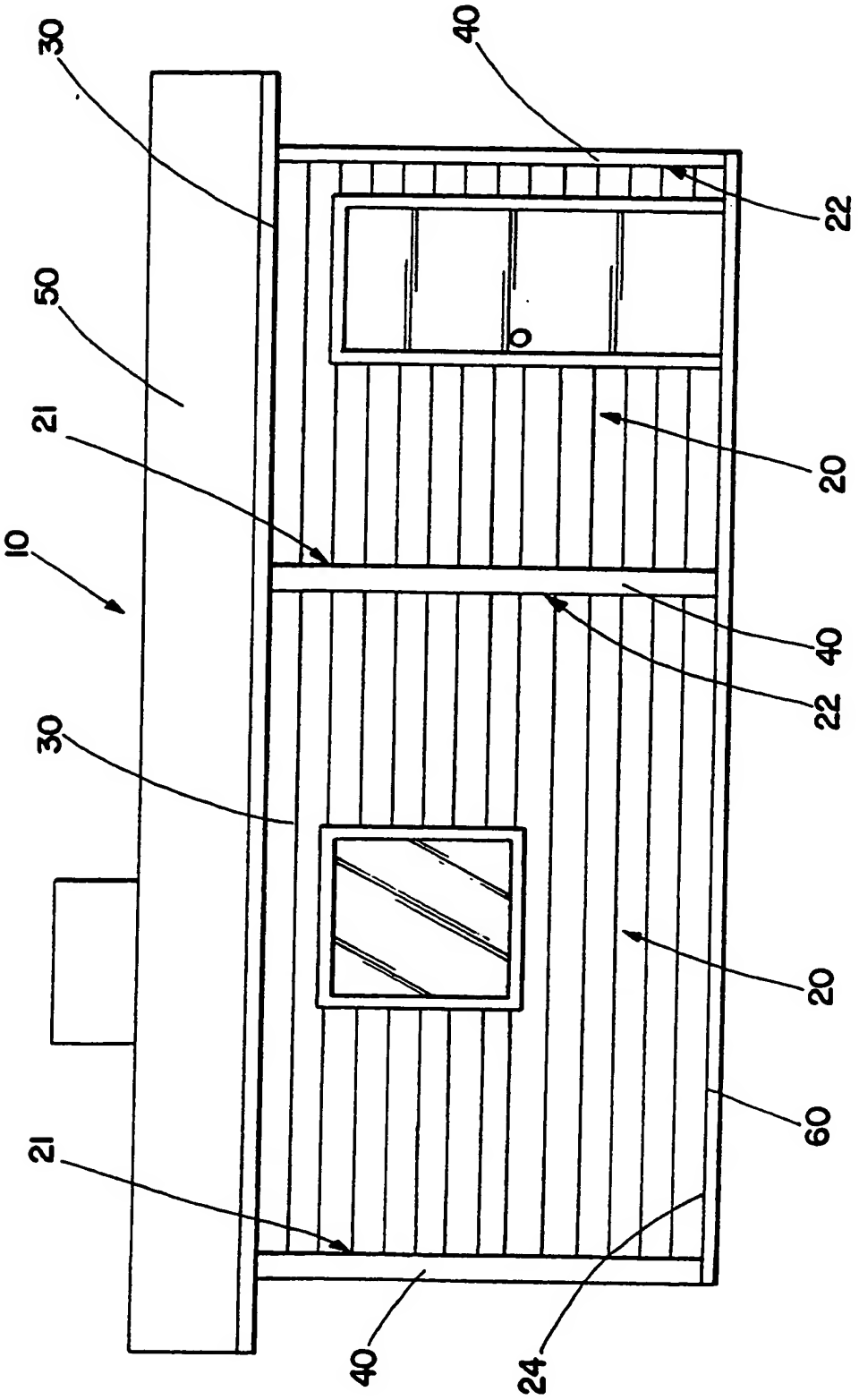


Fig. 2

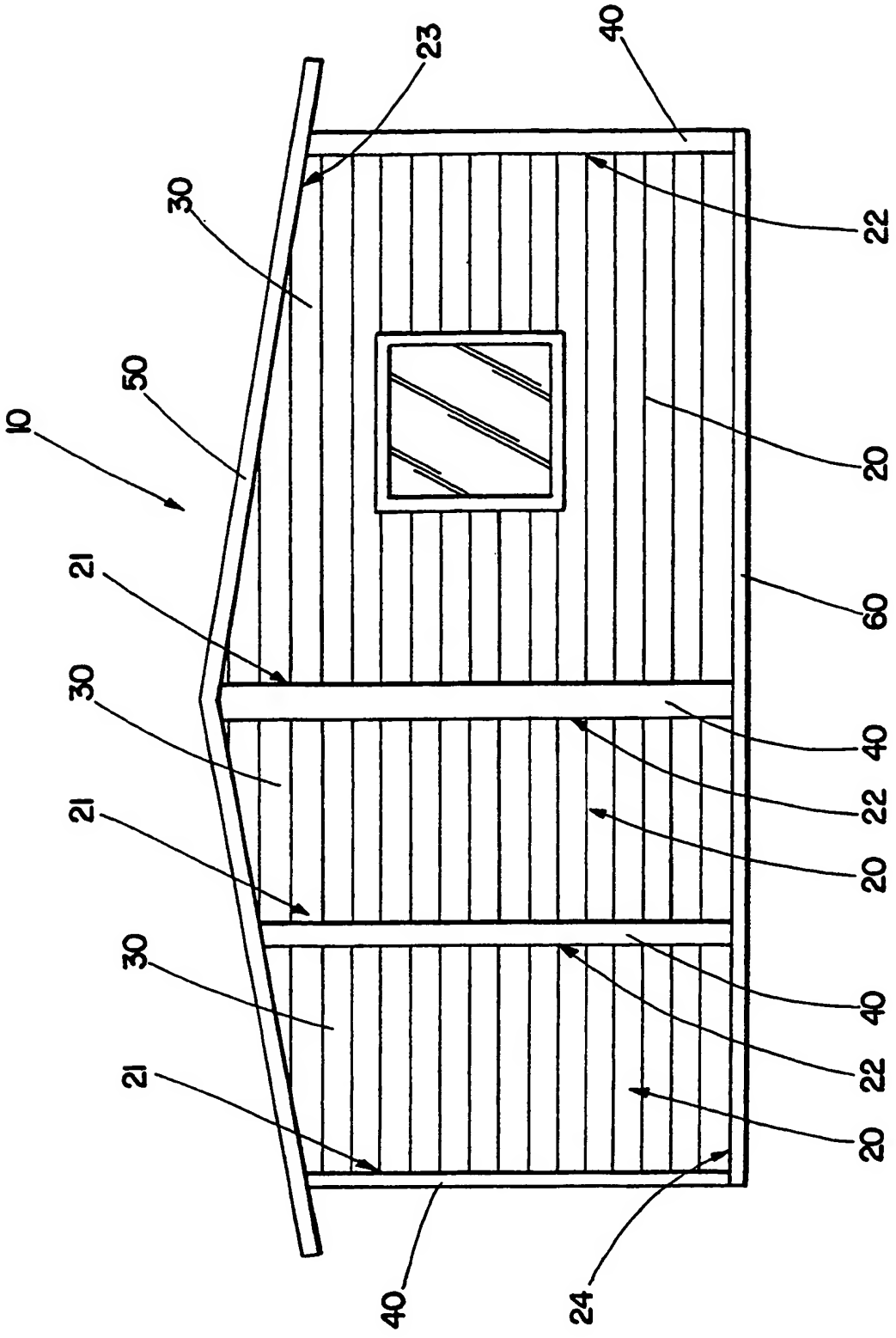


Fig. 3

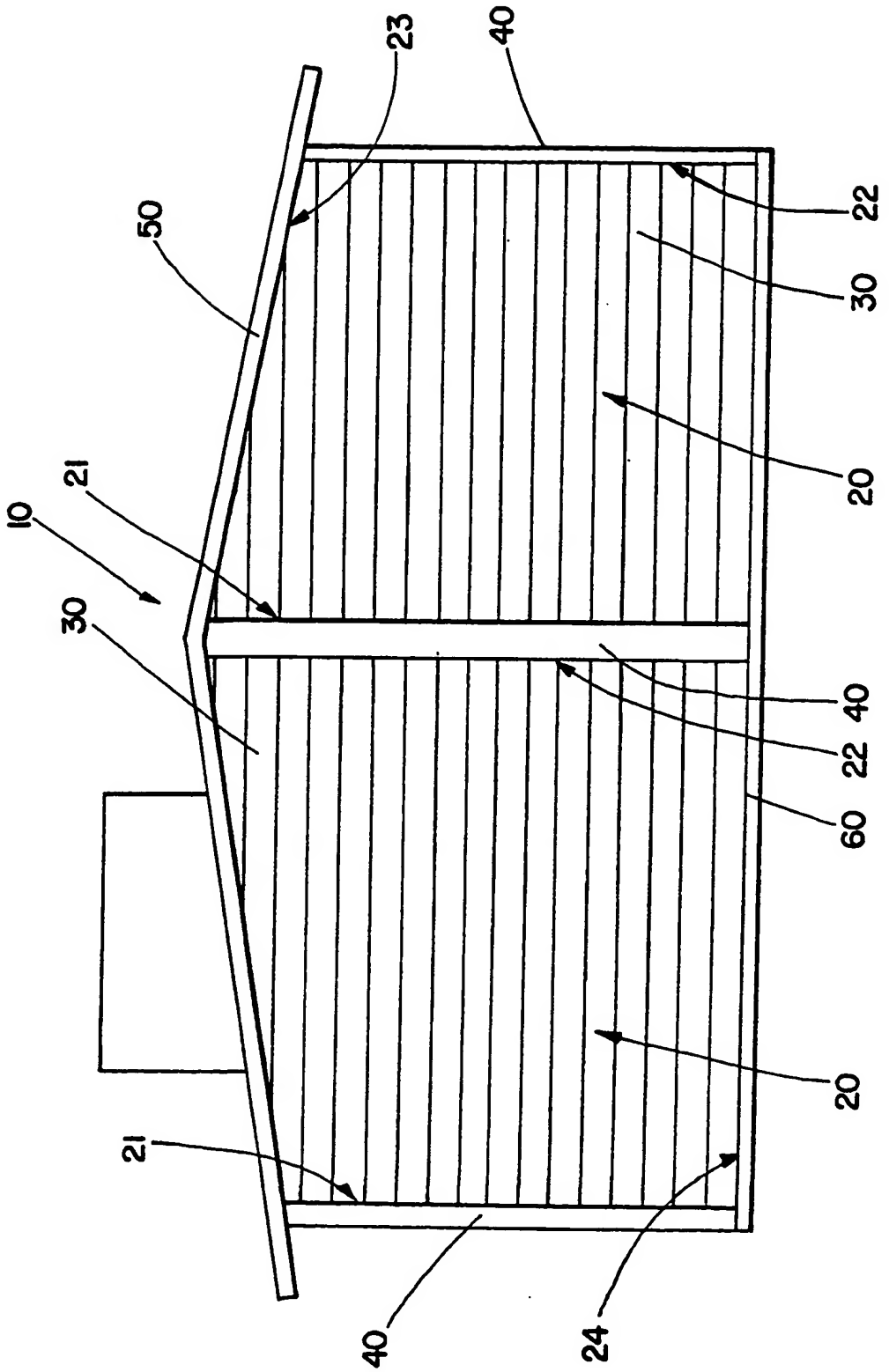


Fig. 4

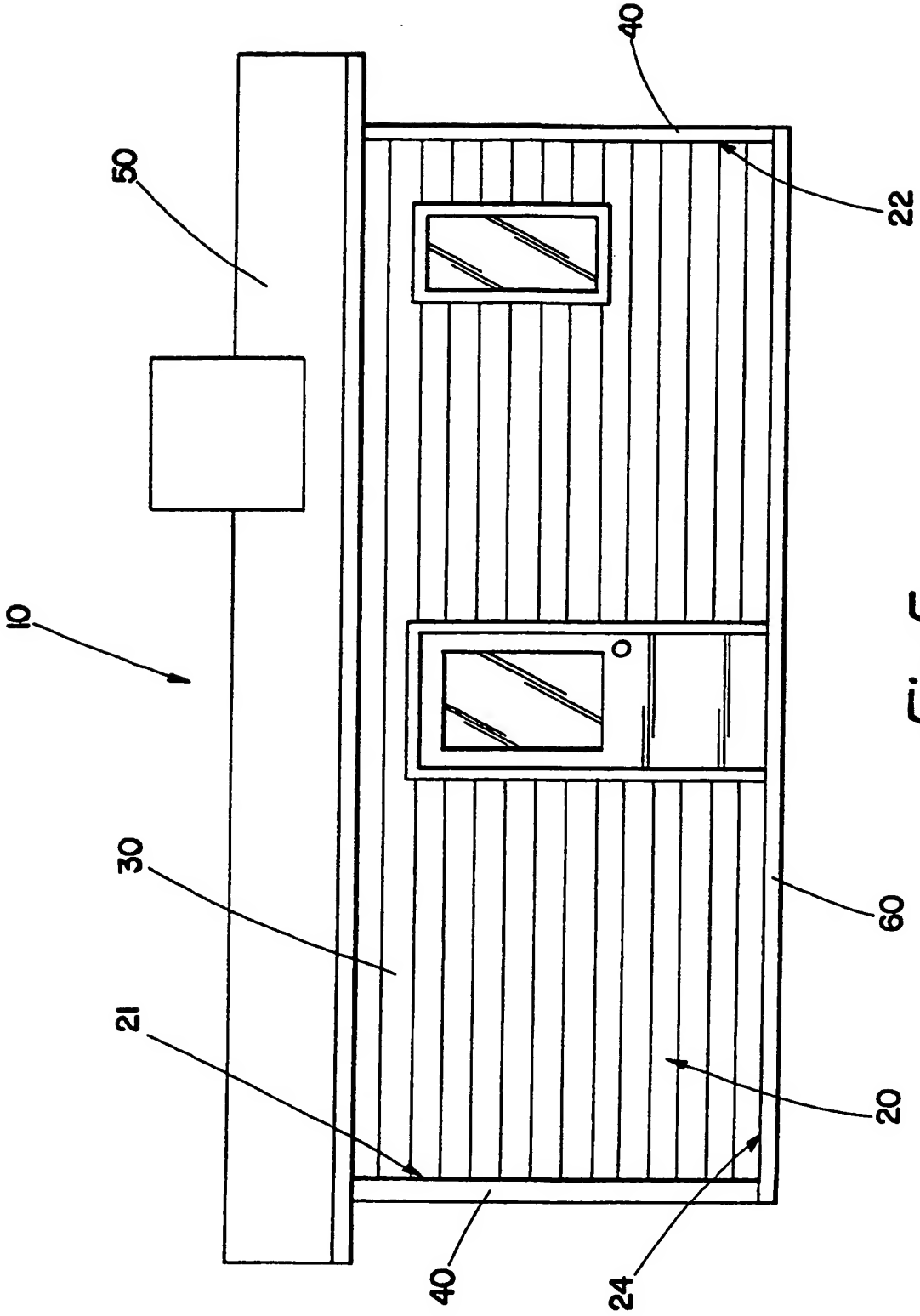
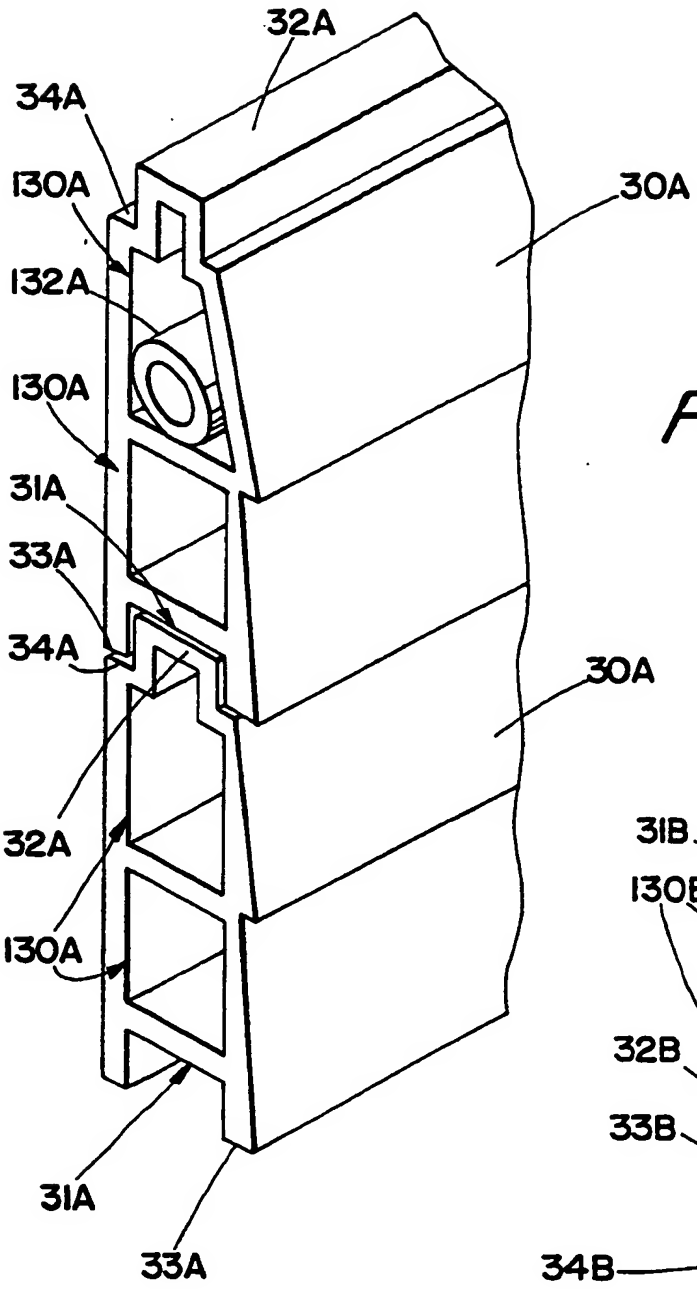


Fig. 5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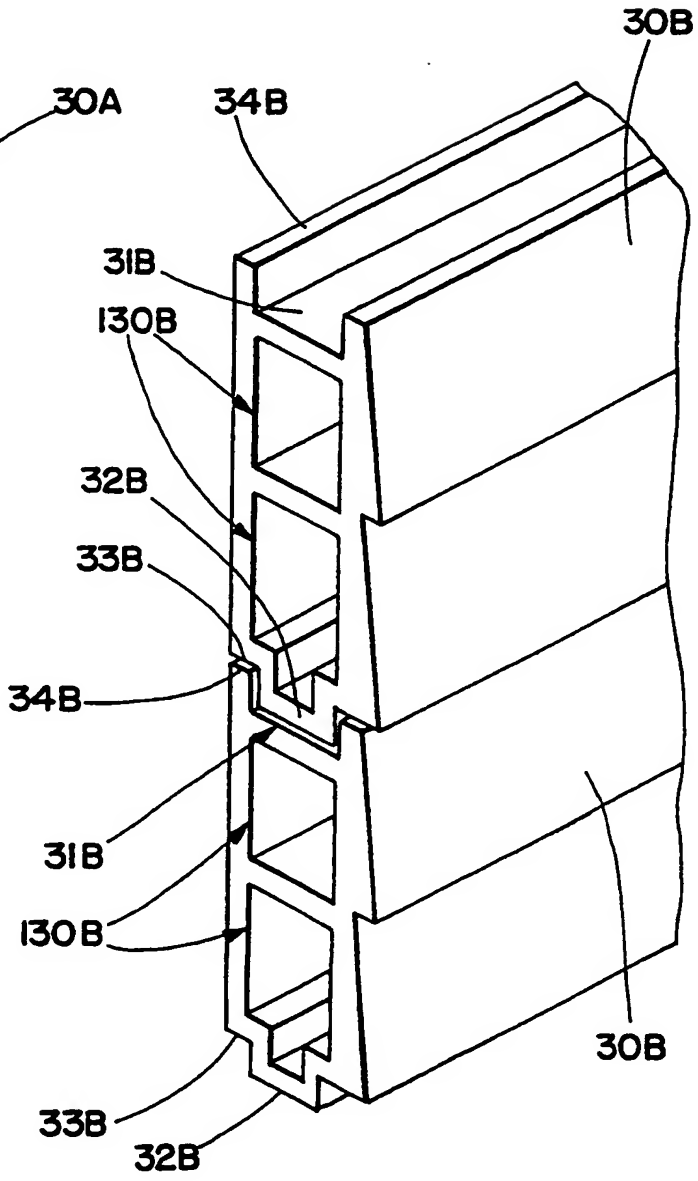
31A
33A
34A
30A
32A
130A
31A
33A

Fig. 6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32B
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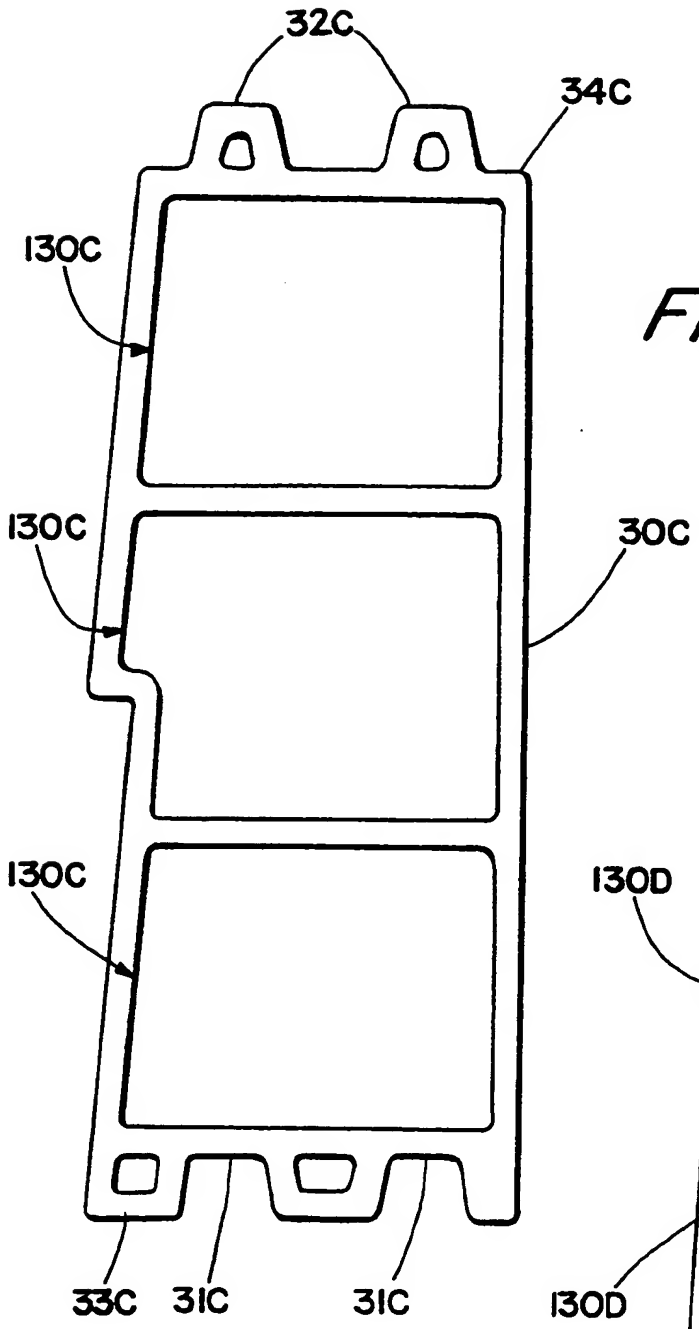
31B
130B
30B
33B
32B

Fig. 7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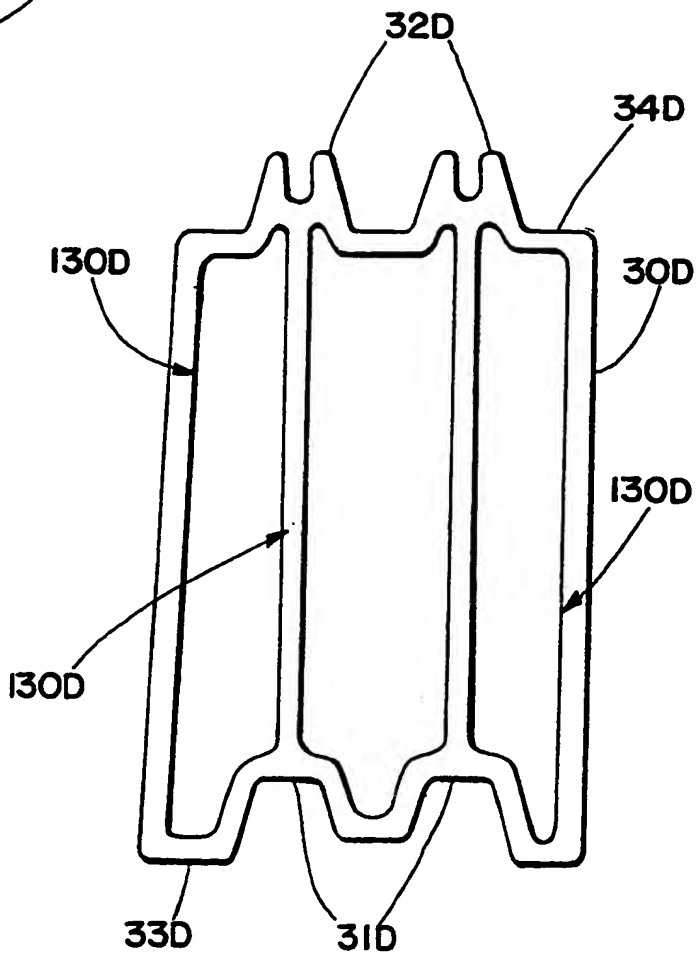
31C
31C

Fig. 8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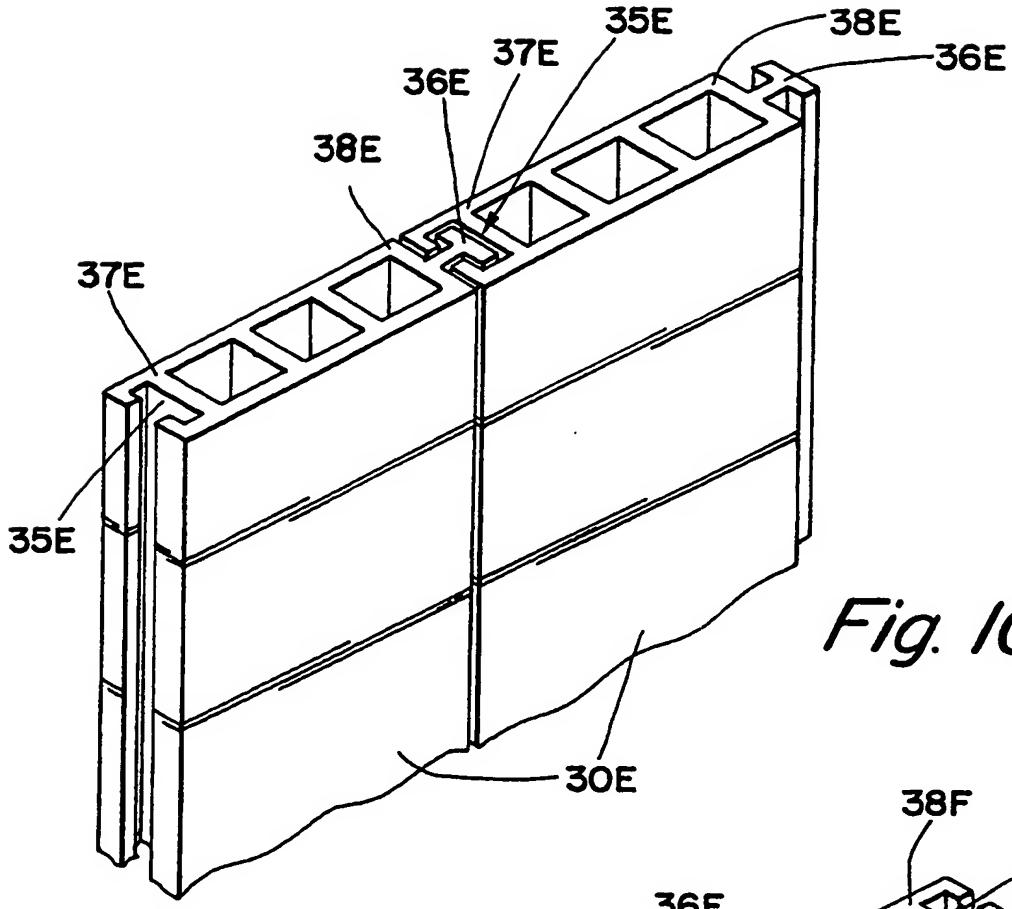
33D
31D

Fig. 9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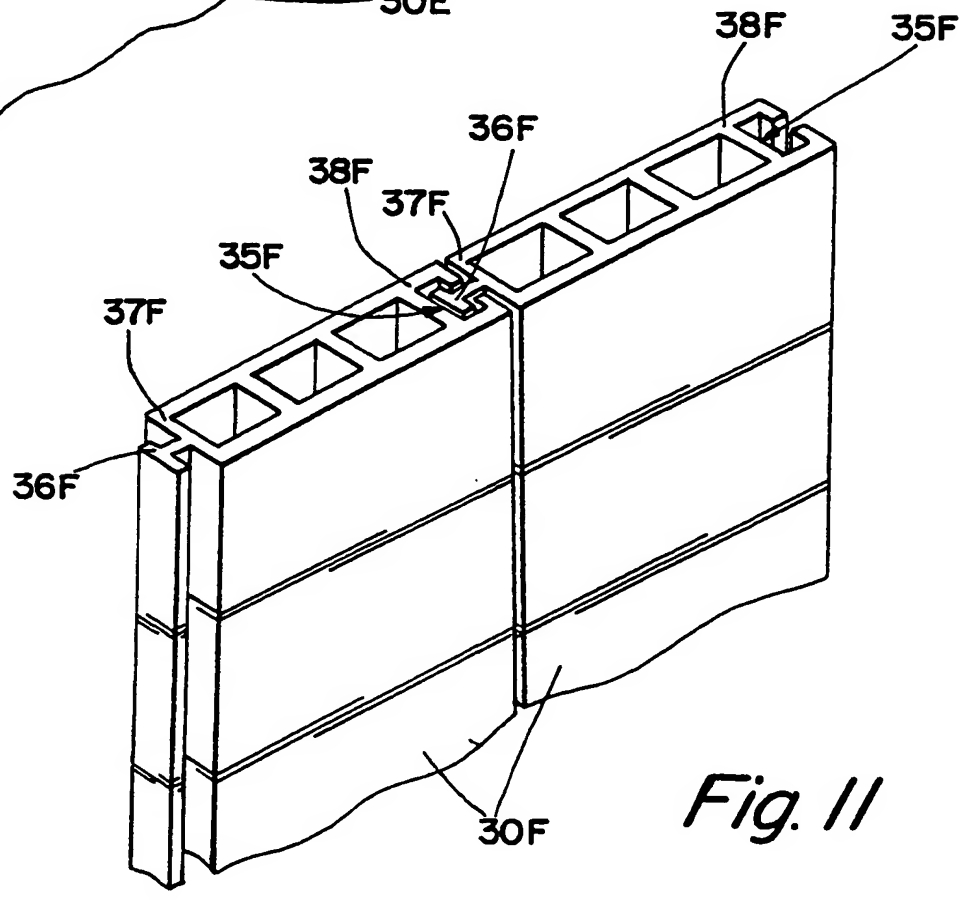
30E

Fig. 10


38F
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36F
30F

Fig. 11

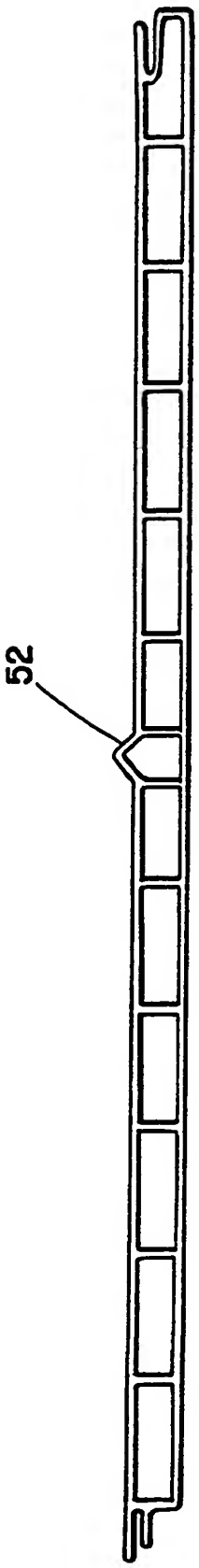

Fig. 12

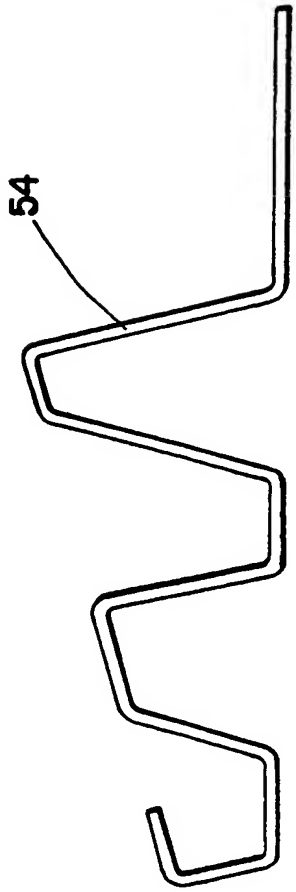

Fig. 13

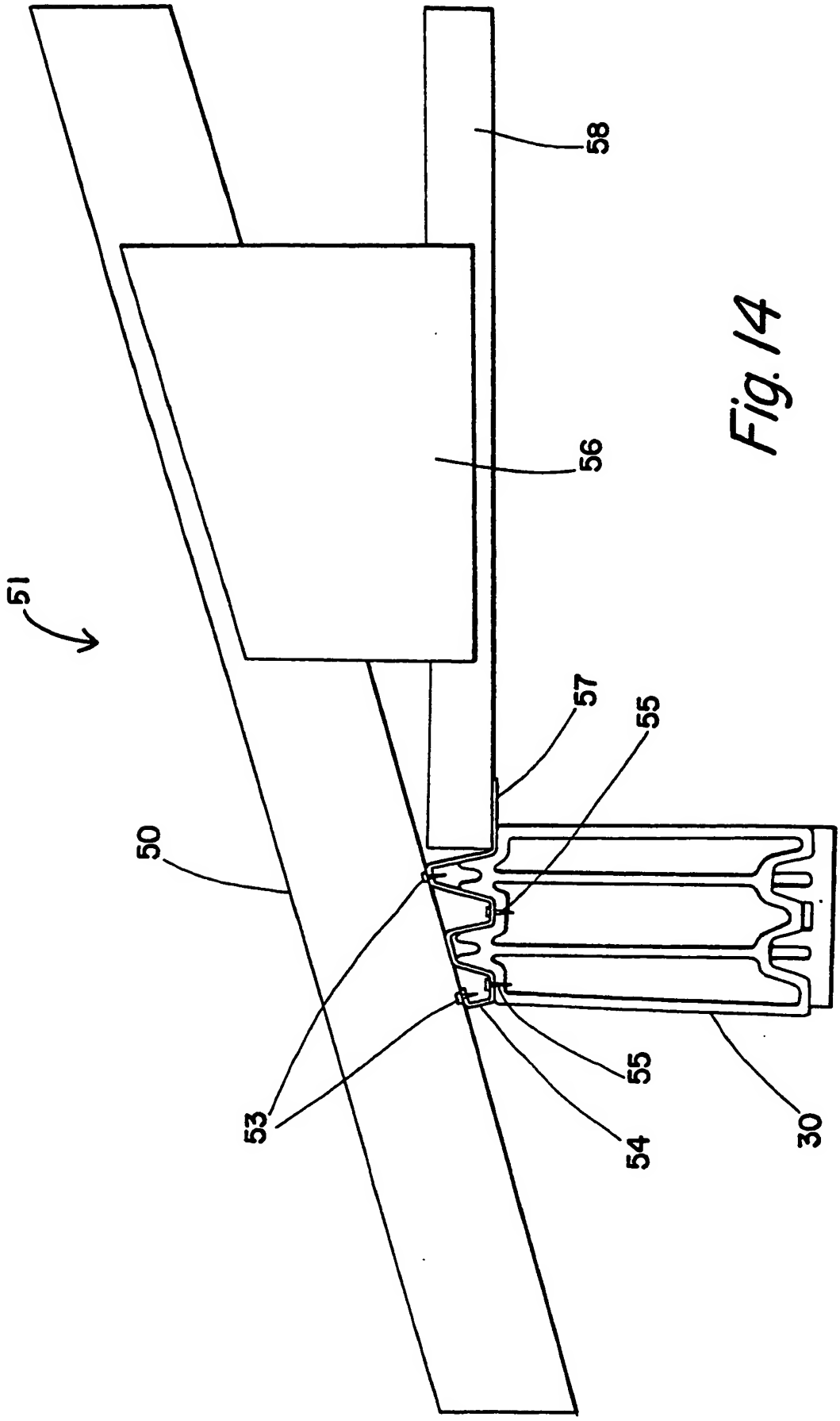

Fig. 14

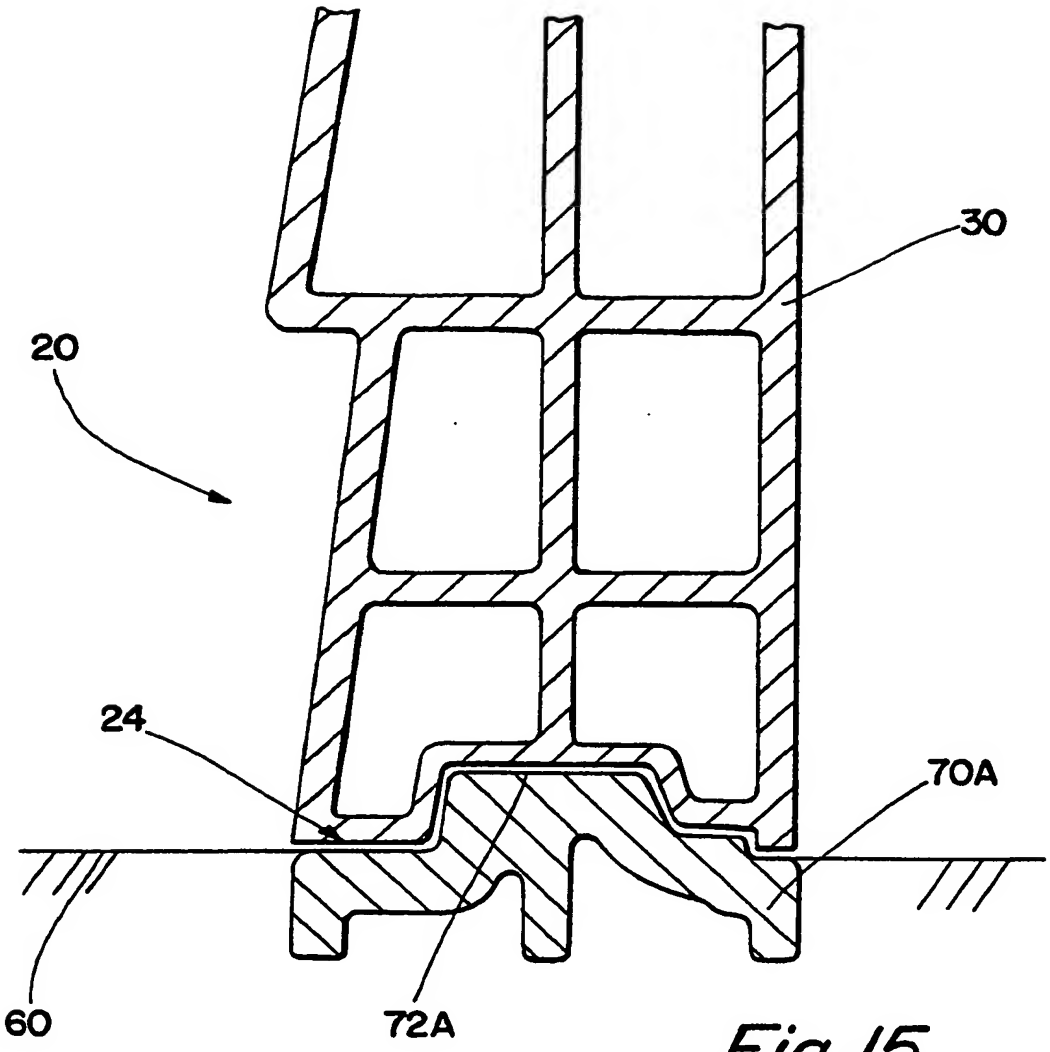

Fig. 15

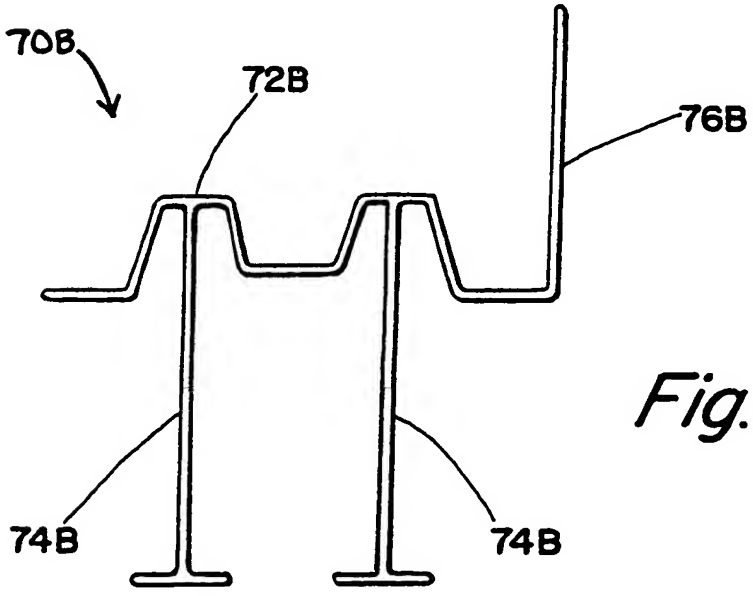

Fig. 16

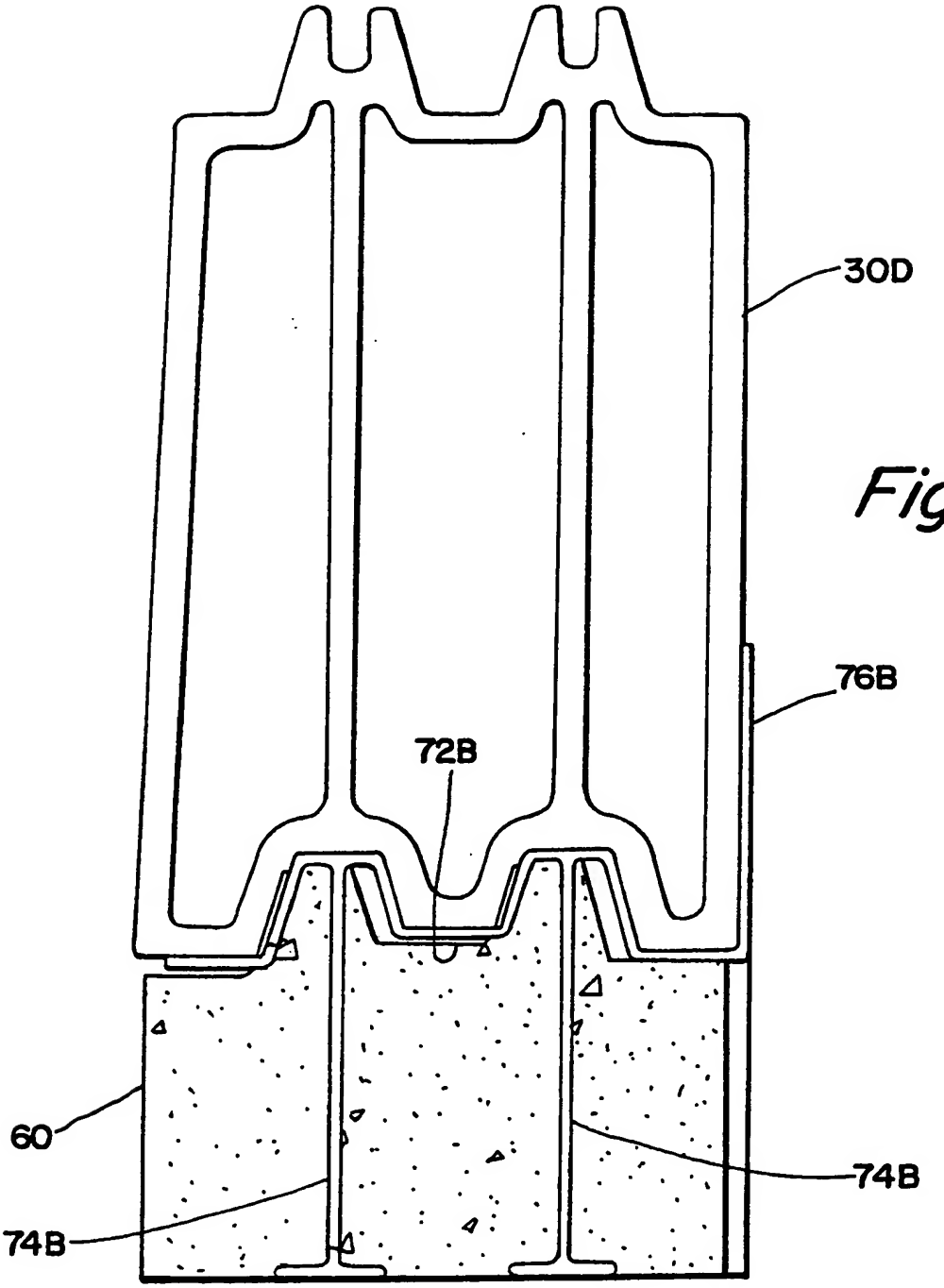

Fig. 17

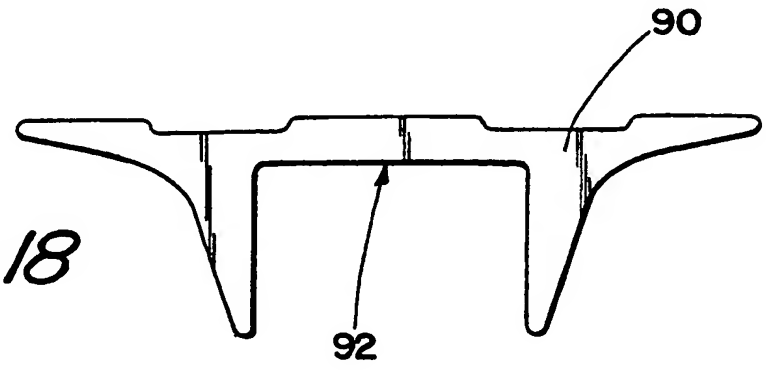

Fig. 18

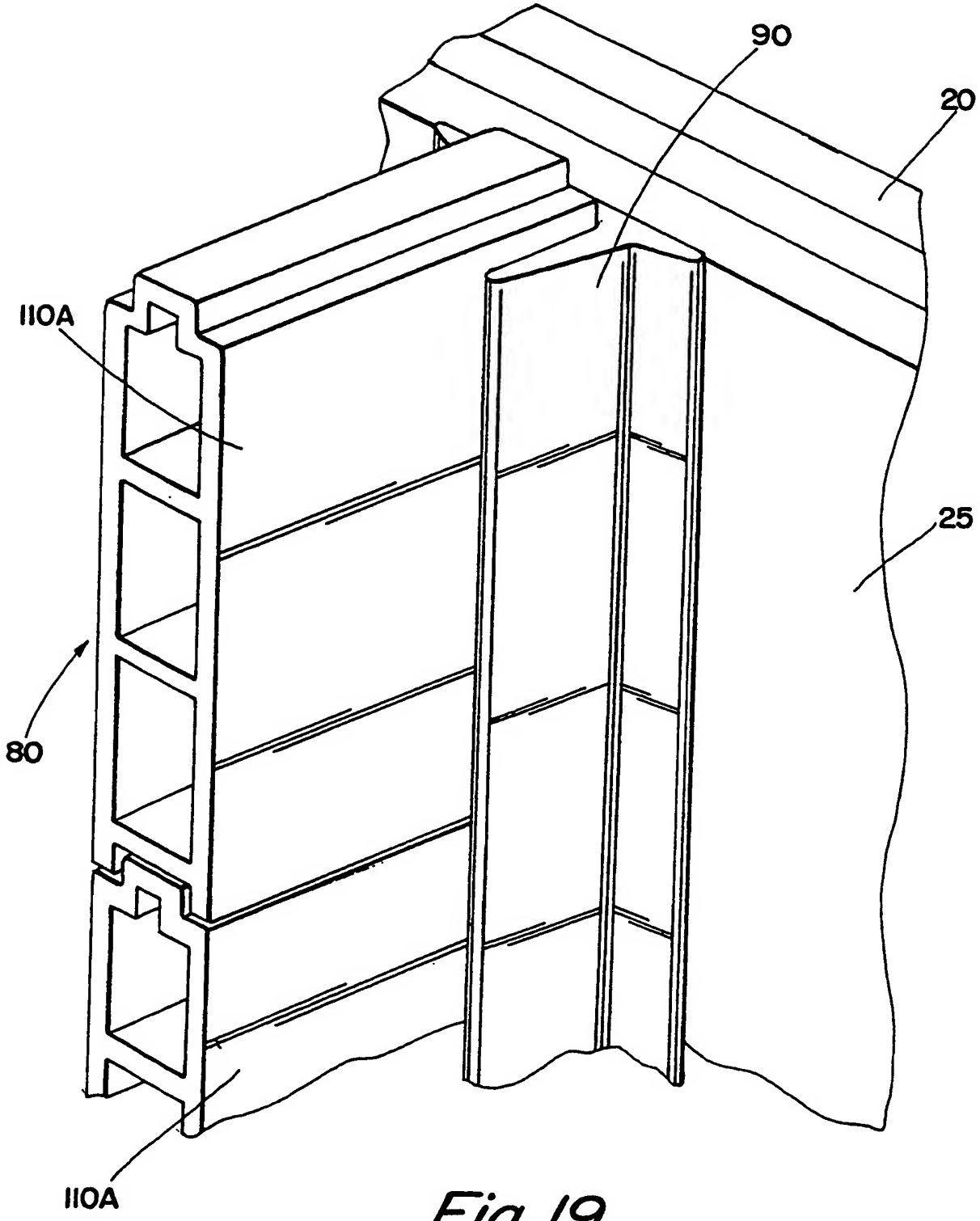

Fig. 19

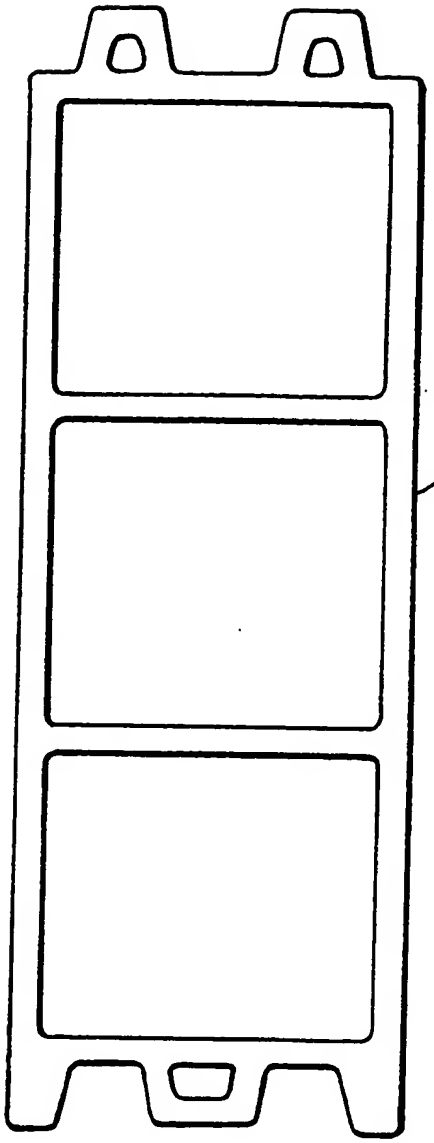

Fig. 20

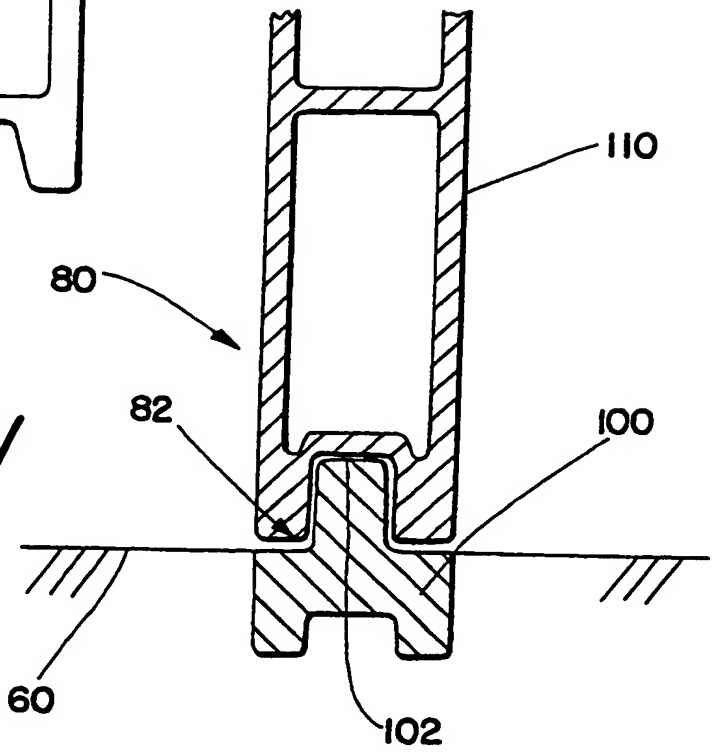

Fig. 21

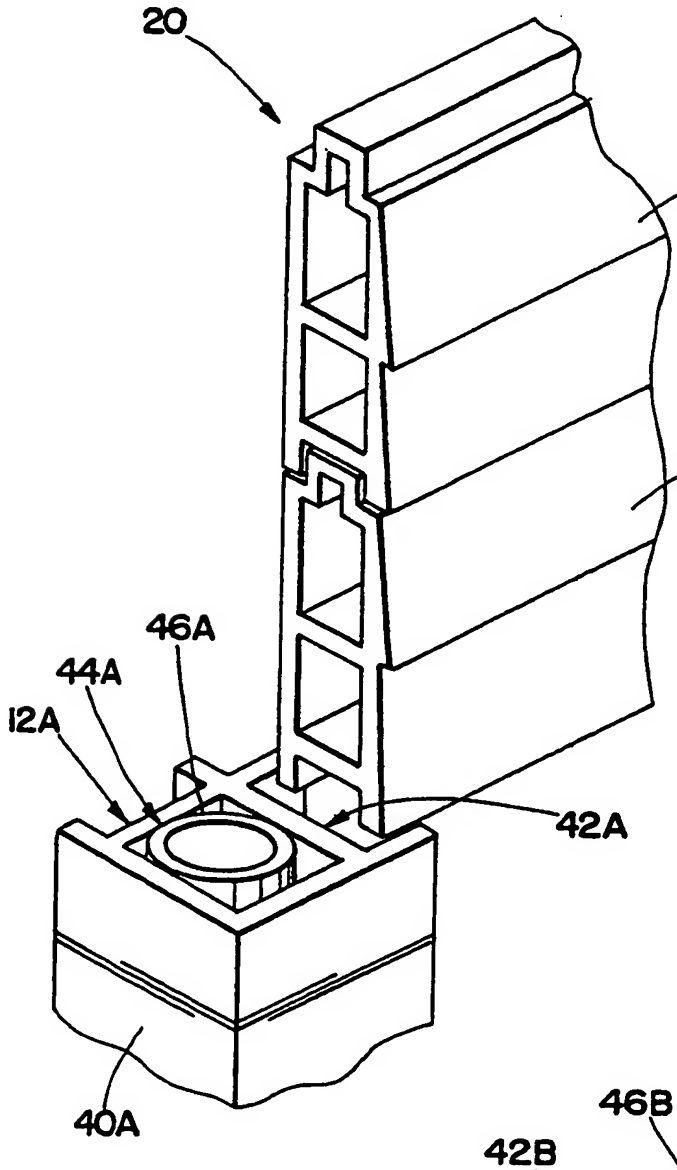

Fig. 22

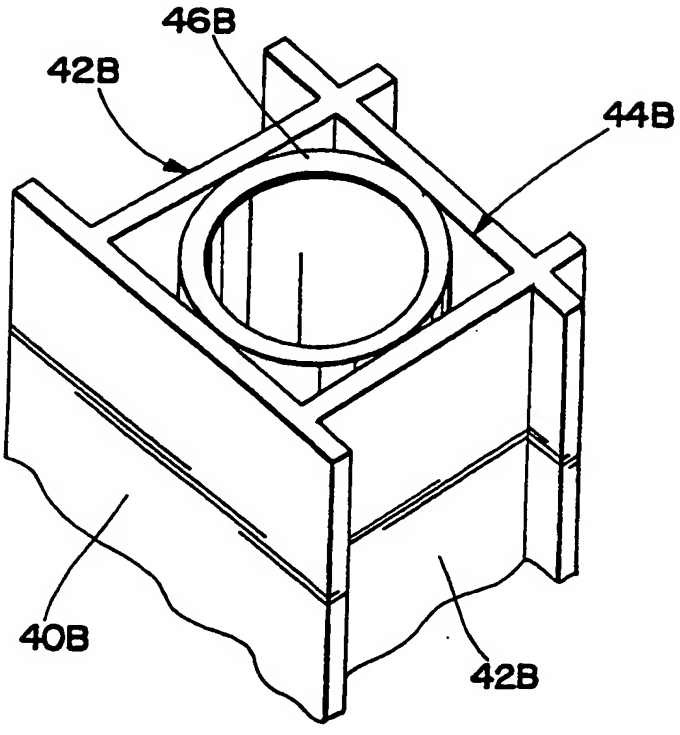

Fig. 23

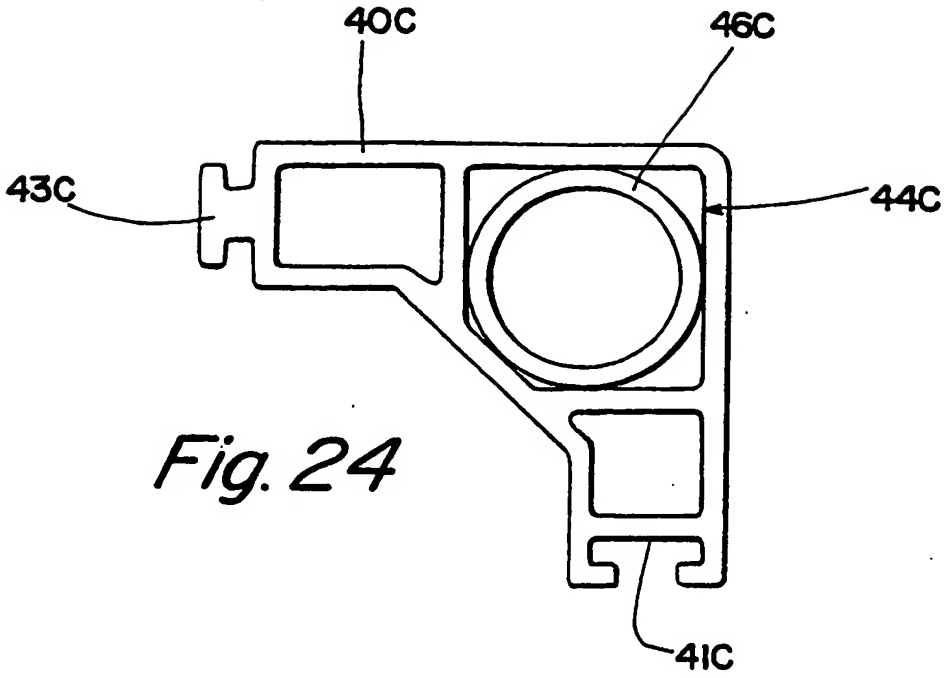

Fig. 24

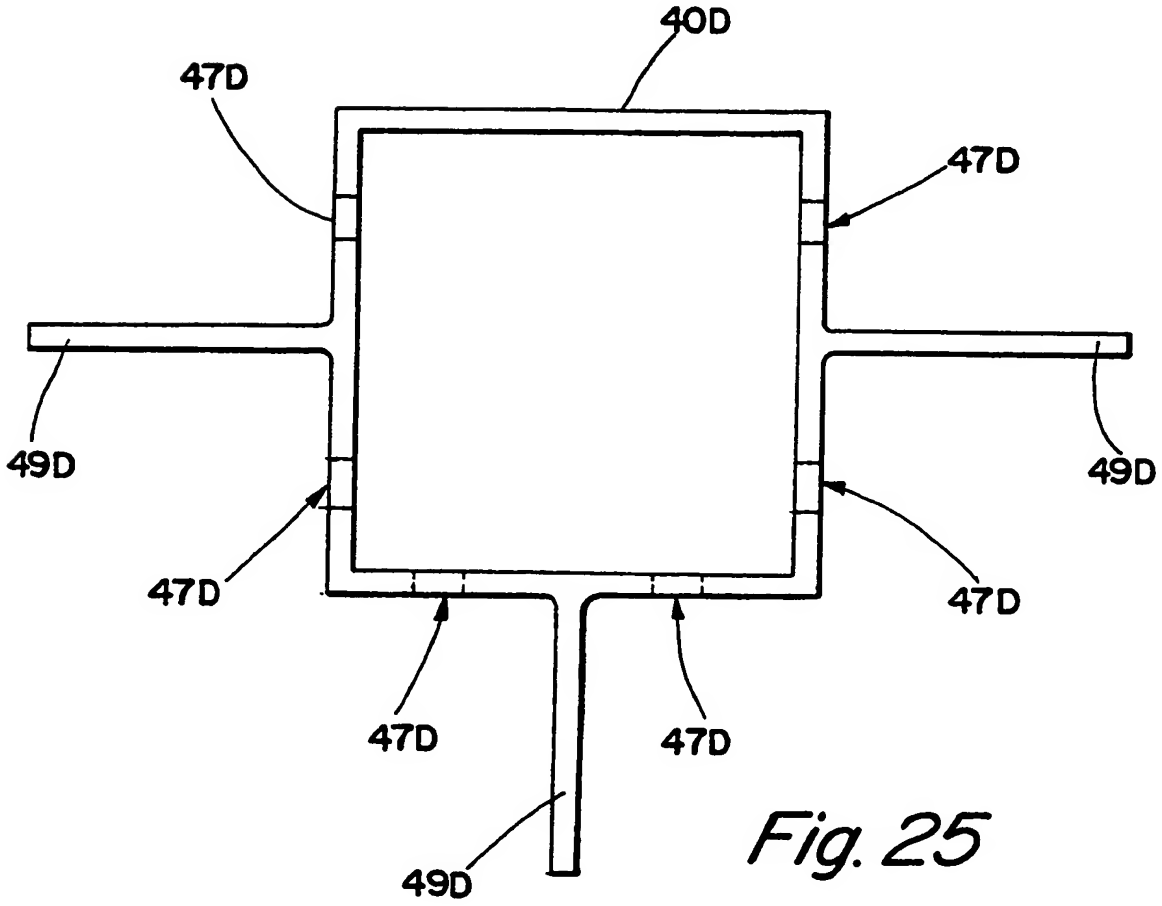

Fig. 25

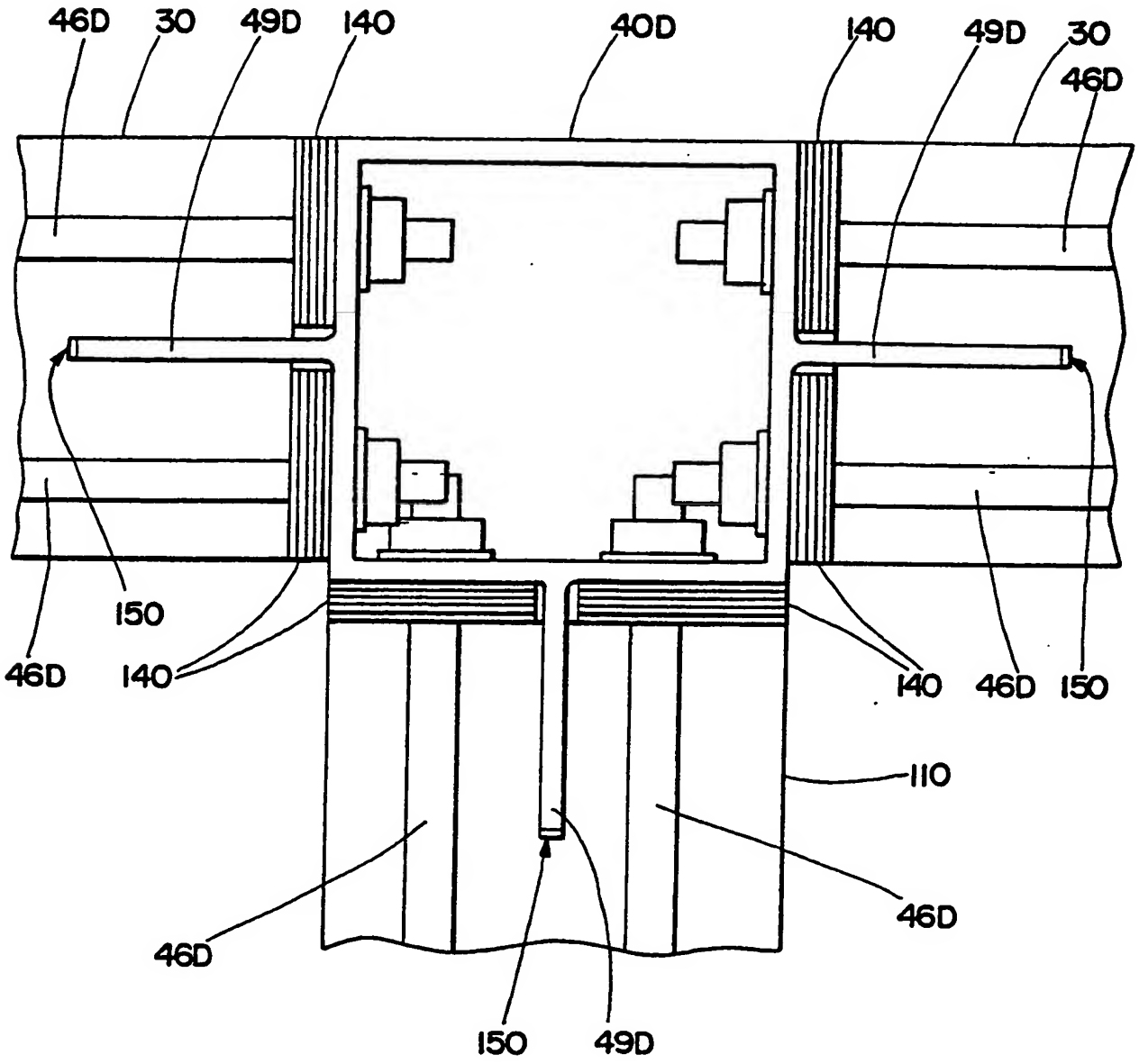
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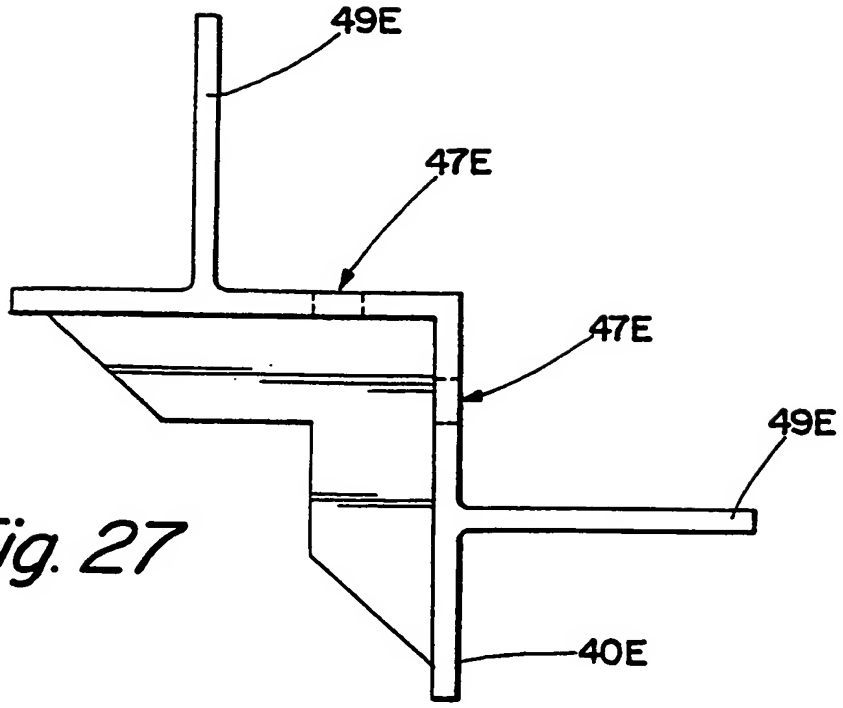
Fig. 26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40E

Fig. 27

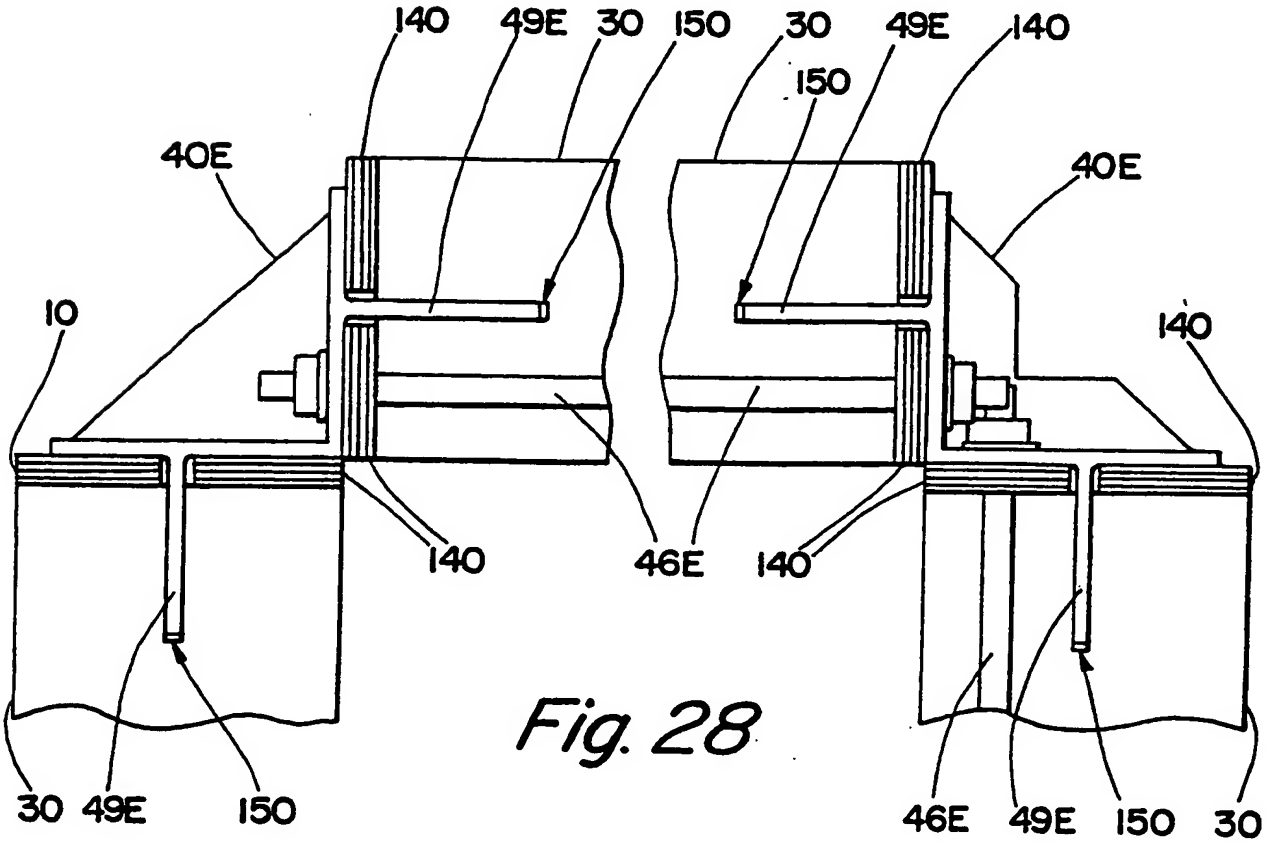
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Fig. 28

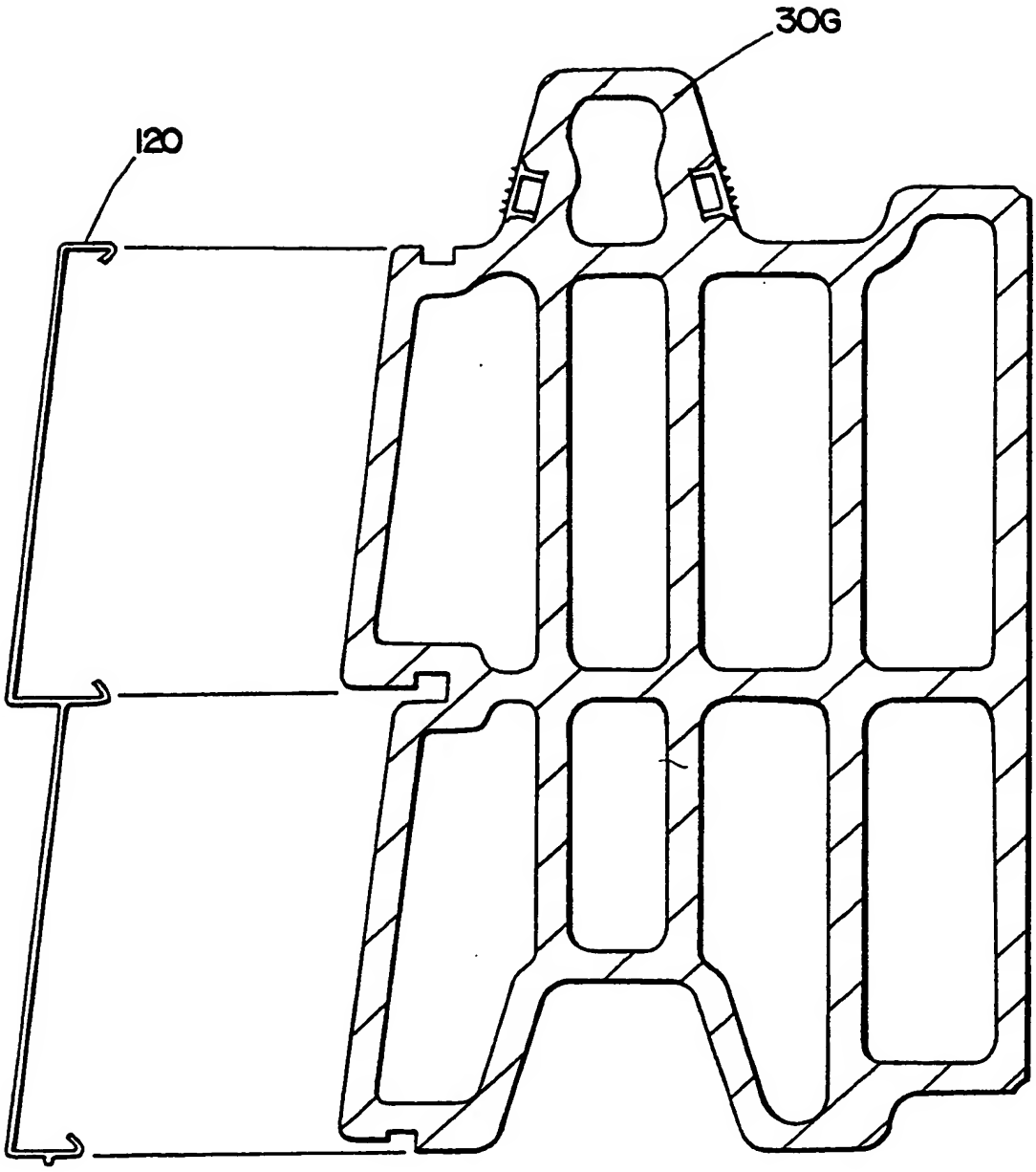

Fig. 29

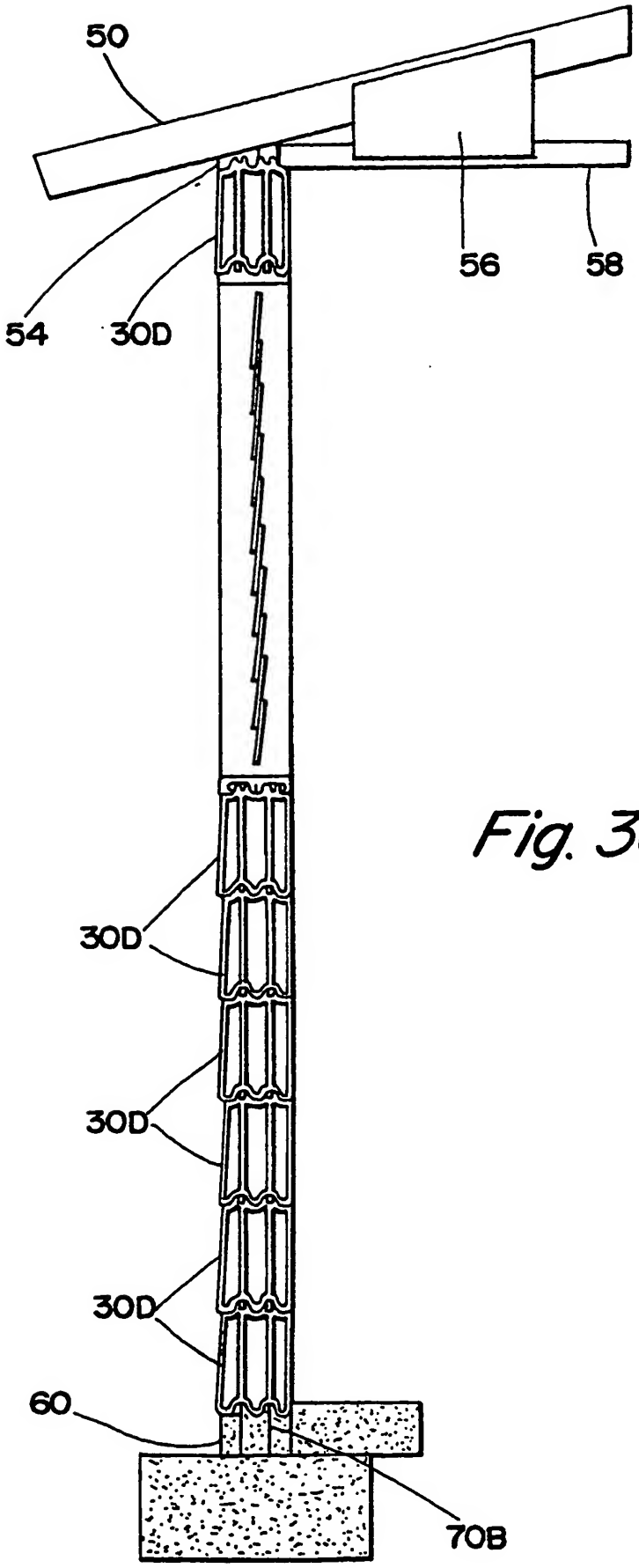

Fig. 30

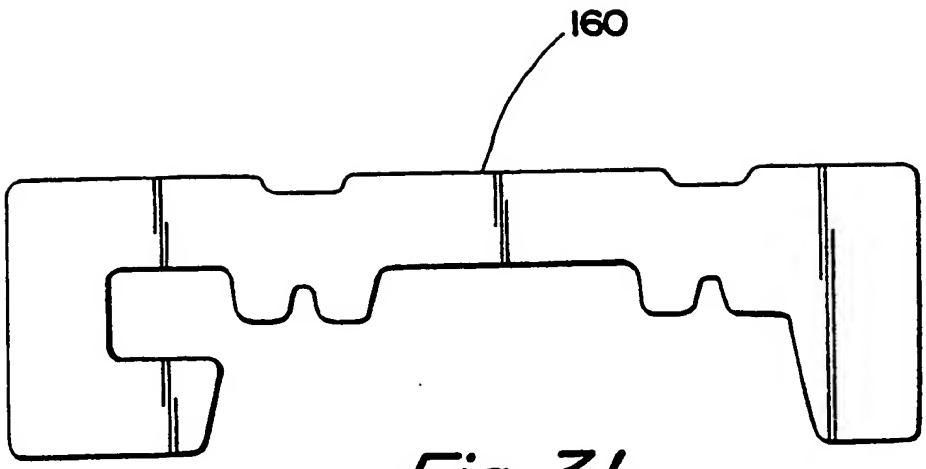

Fig. 31

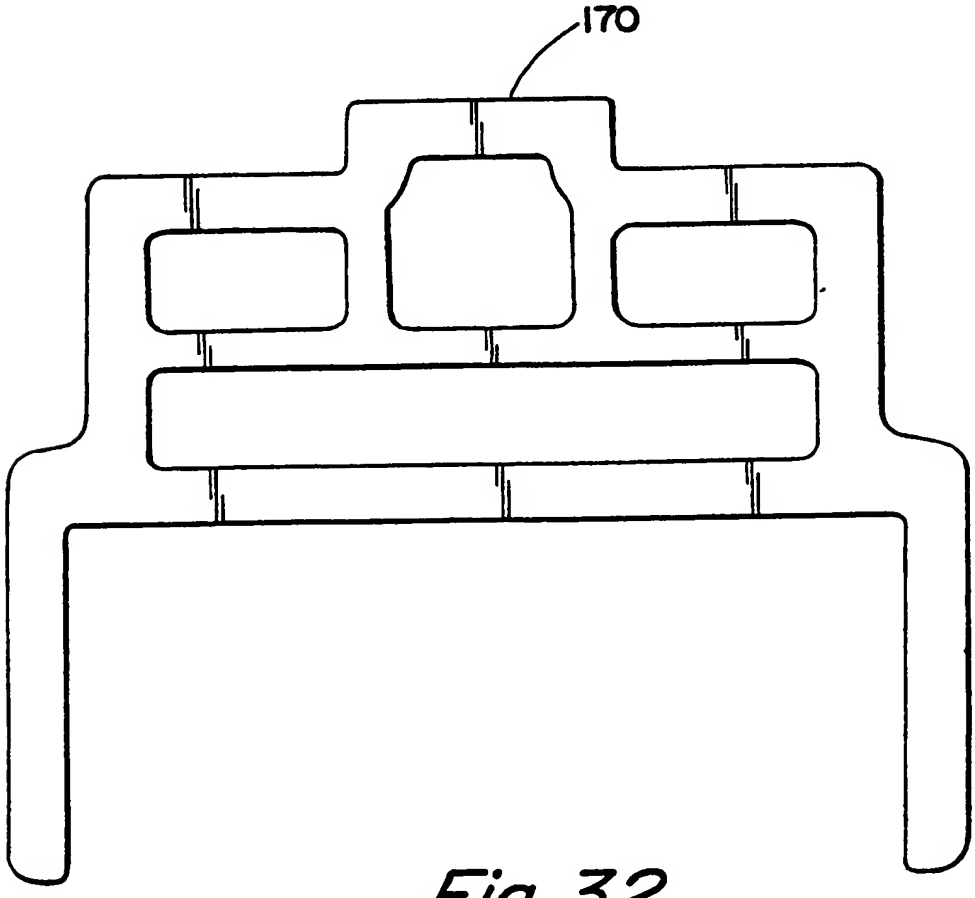

Fig. 32